RESEARCH REPORT NO. 2
LATIN AMERICAN STUDIES CENTER Michigan State University

MARKET PROCESSES IN THE RECIFE AREA OF NORTHEAST BRAZIL

Charles Slater, Harold Riley, Vincent Farace, Kelly Harrison, Ferdinando Neves, Alan Sogatay, Mark Doctoroff, Donald Larson, Robert Nason, Thomas Webb



MARKETING IN DEVELOPING COMMUNITIES SERIES

Based upon research conducted by Michigan State University in collaboration with SUDENE, the Northeast Brazil Economic Development Agency

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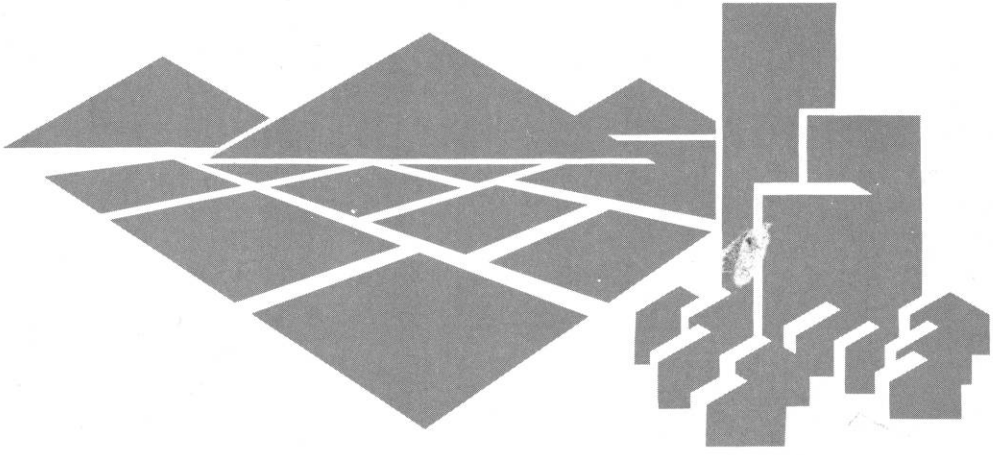

MARKETING IN DEVELOPING COMMUNITIES SERIES

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FOREWORD

During the past three years, a Michigan State University research team has conducted studies of marketing systems in three Latin American communities. Field research operations were carried out in Puerto Rico in 1965-66 and in Bolivia and Northeast Brazil during 1966-67. This report summarizes the results of the Northeast Brazil study. Similar reports have been prepared for the other two community studies.

This research program has been carried out under two interrelated contracts financed by the U.S. Agency for International Development. The first contract, A Comparative Study of Food Marketing Systems in Selected Latin American Countries (AID/TCR-786) was conducted for the Technical Cooperation and Research Branch of USAID, Washington. It has two interrelated goals: (1) to provide developing countries with information to assist in the design of improved food marketing systems, and (2) to formulate a more adequate conceptualization of the role of marketing in the development process. The second contract created the Latin American Market Planning Center (LAMP) at Michigan State University (AID/la-364) which operated through the Latin American Bureau of AID, Washington. The LAMP project expanded the scope of the research program to include the marketing of farm inputs and selected industrially produced consumer goods. It also expanded the efforts to develop systems models as an analytical technique to evaluate the economic consequences of alternative marketing reforms. Advisory activities to AID missions and foreign government agencies on market development programs have been a part of this second contract.

The Northeast Brazil program was carried on as a combined effort of both projects. The field research was conducted by a joint task force organized under a memorandum of agreement linking Michigan State University with SUDENE (the Northeast Brazil Economic Development Agency) with concurrence and logistical support from USAID/Brazil.

ACKNOWLEDGEMENTS

The support given by Martin Stoller, AID/Washington; Dr. Donor Lion, formerly Director of USAID/NEAO of Brazil; Dr. Rubens Costa, formerly Superintendent of SUDENE and currently President of the Bank of the Northeast of Brazil S/A; Brigadier General Euler Bentes Monteiro, present Superintendent of SUDENE; Dr. Richard Newberg, Rural Development Officer of USAID/Brazil; Phillip Smith, Rural Development Officer of USAID/NEAO of Brazil; and Geraldo de Andrade Teixeira, former Director of the Department of Agriculture and Supply of SUDENE enabled us to initiate this study and to conduct the research. The study plan was developed by the joint efforts of the Brazilian and U.S. team within the Division of Supply of the Department of Agriculture and Supply of SUDENE. Dr. Antonio Cardoso do Rego Barros, Director of the SUDENE Division of Supply, actively participated in the early organization of the project and was later succeeded by Dr. José Anchieta Espinola Pinto Coêlho. We express special appreciation to Dr. Fernando Melo do Nascimento, Director of the SUDENE Department of Agriculture and Supply, and Mr. Freeman Smith, Rural Development Officer, USAID/NEAO of Brazil, for their assistance in arranging the financial administration of this rather broad research task that may lead to some significant development programs in Northeast Brazil.

The following agencies were particularly helpful and assisted us in this research effort.

Centrais de Abastecimento do Nordeste S/A (CANESA)
Universidade Federal Rural de Pernambuco
Banco do Nordeste do Brasil S/A
Fundação para o Desenvolvimento Industrial do Nordeste (FUNDINOR)
Superintendencia Nacional do Abastecimento (SUNAB)
Faculdade de Ciencias Econômicas da Universidade Federal de Pernambuco
Conselho de Desenvolvimento de Pernambuco (CODEPE)

Our appreciation and thanks to all private and government institutions not mentioned here but without whose cooperation this report certainly would not have been possible.

This project was a broad-gauged research effort enhanced by the joint participation of Brazilian and American technicians. This bi-cultural interaction proved to be a major strength of the research project, as did the continued exchange of ideas among

the interdisciplinary team of agronomists, economists, marketing specialists, communication specialists, agricultural economists and business management specialists.

The following is a list of persons who are primarily responsible for the investigation:

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During the data collection phase, the above staff was assisted by a group of about 50 university students and recent graduates. The outstanding work of this group of individuals made possible the systematic collection and analysis of large quantities of information about the marketing system in the Northeast.

The project benefited substantially from the participation of Michigan State University faculty members who assisted in research planning activities both on campus and at the field office in Recife, Brazil. Dr. Donald Taylor, Department of Marketing; Dr. James Shaffer, Department of Agricultural Economics; and Dr. Vincent Farace, Department of Communication, made significant contributions to the conceptual and organizational aspects of the research operations. Dr. Farace also assisted in the detailed planning of data processing and in the editing of the research report.

Significant contributions were made by Alan Bogatay, who first assisted us in the early stages of organizing the joint task force and again at the end of the project, when he actively participated in the preparation of the final report.

We would like to express our appreciation for the spirit of cooperation and coordinated leadership displayed by Dr. Ferdinando de O. Santos Neves and Dr. Kelly M. Harrison, who overcame more than their fair share of administrative delays and financial planning problems to complete the field research "on target and on time."

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SOME HIGHLIGHTS OF THE STUDY

1. This report summarizes a diagnostic study of the marketing system linking a large urban center in Northeast Brazil with the rural area providing most of its food supply. There were two major purposes for the study. One was to describe and analyze the existing marketing system in Northeast Brazil as a basis for formulating recommendations for improvements that would contribute to regional development goals. Another purpose was to contribute to a more useful conceptualization of market processes in economic development.

2. SUDENE's Third Master Plan had expressed a growing awareness of the importance of market processes in the stimulation of economic growth. The SUDENE/MSU research was designed to assist in the specification of development policies and programs which would better coordinate agricultural and industrial production with domestic consumption.

3. The field research included 2,350 structured, personal interview surveys of market participants including consumers, retailers, wholesalers, processors, assemblers, farmers and manufacturers of selected industrial goods. The geographic focus was narrowed to Recife and the rural area which serves as its primary source of agricultural products.

4. The study confirmed that the 34/18 program is rapidly expanding industrial capacity in the Recife area. Yet, marketing institutions and effective demand for this industrial output are not being created at the same rate.

5. The urban food marketing system in Recife is in the early stages of modernization. Large self-service retail outlets have initiated aggressive pricing policies and vertically coordinated systems of procurement. The new Recife wholesale food supply center is not yet fully integrated into the marketing system.

6. Agricultural production methods are still very primitive in the Recife foodshed area. Modern agricultural inputs are largely unavailable. Low knowledge levels among farmers and

poorly coordinated product and input markets discourage the adoption of new production technology.

7. Some of the major policy recommendations were as follows:

   a. Modify industrial development programs so that a portion of investment funds are directed toward marketing systems for manufactured products, especially agricultural inputs and low-priced consumer goods.

   b. Stimulate and reinforce the modernization of the Recife food marketing system through a program providing credit and technical assistance to food retailers with emphasis on increasing size of operations and rationalizing the related wholesaling functions.

   c. Improve performance in rural assembly markets by expanding and strengthening the existing government price stabilization programs for staple food crops, developing a market information system linking interior trading centers with Recife, and improving village-to-market convergence center roads.

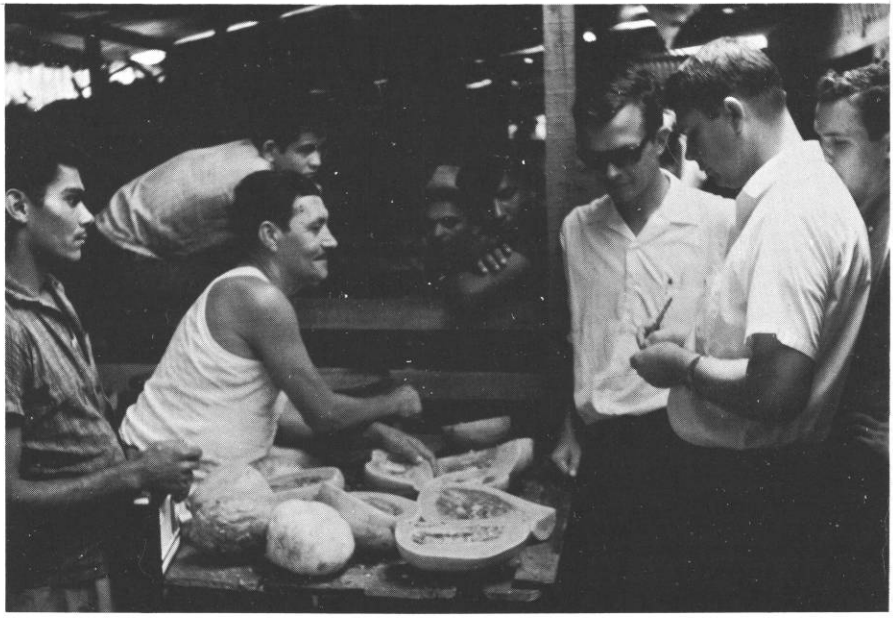
   d. Give high priority to a program of accelerated agricultural research for the testing of new crop varieties, fertilizers, etc., along with a program to provide technical information to farmers and credit for input purchases.

8. A systems model of the Recife foodshed area was developed as a tool for simulating the possible economic effects of selected marketing reform recommendations.

9. The reader seeking a summary of the diagnostic studies and the related recommendations is directed to Chapters 6, 10 and 12.



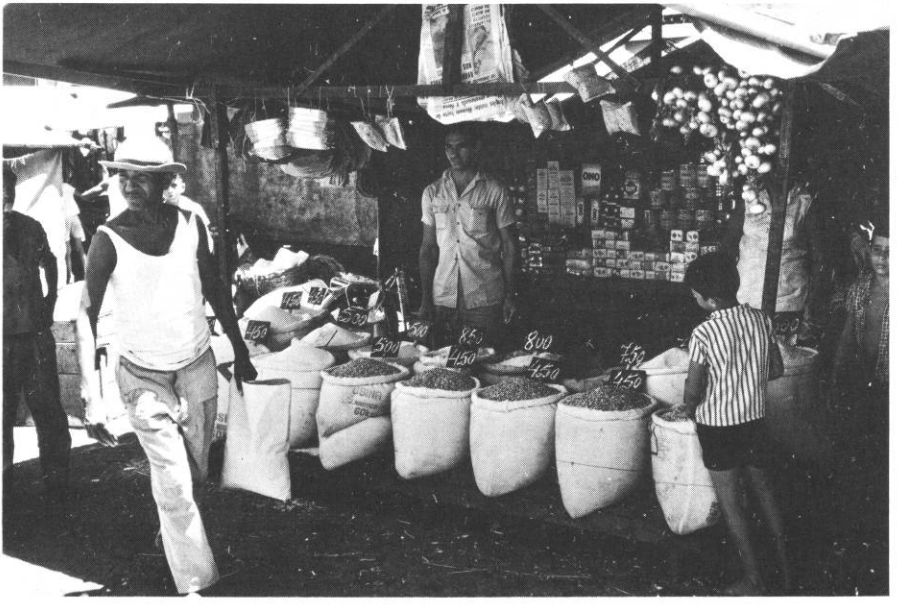
The Central Area of Recife, the Regional Trading Center and government headquarters for Northeast Brazil.



MSU Researchers interview a squash wholesaler in the Recife market.



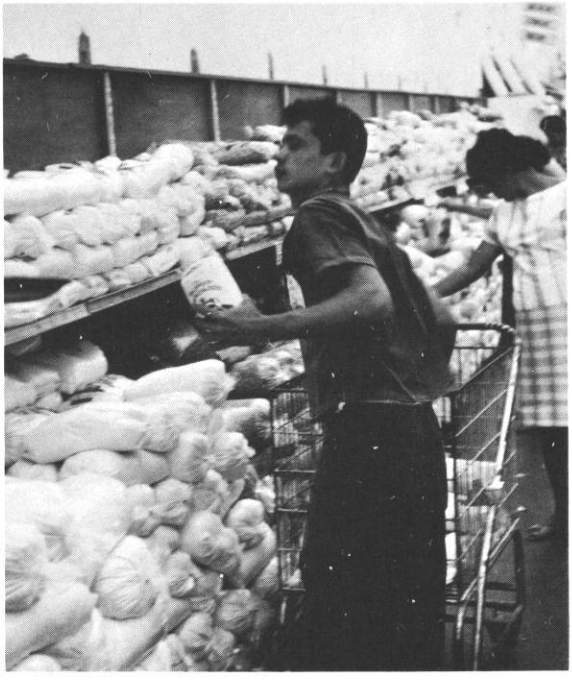
Street fair (feira) in Recife where both food and low-priced consumer goods are sold.



A retailer stall in a Recife public market.



A warehouse building in the new CARE wholesale food distribution center that will serve Recife.



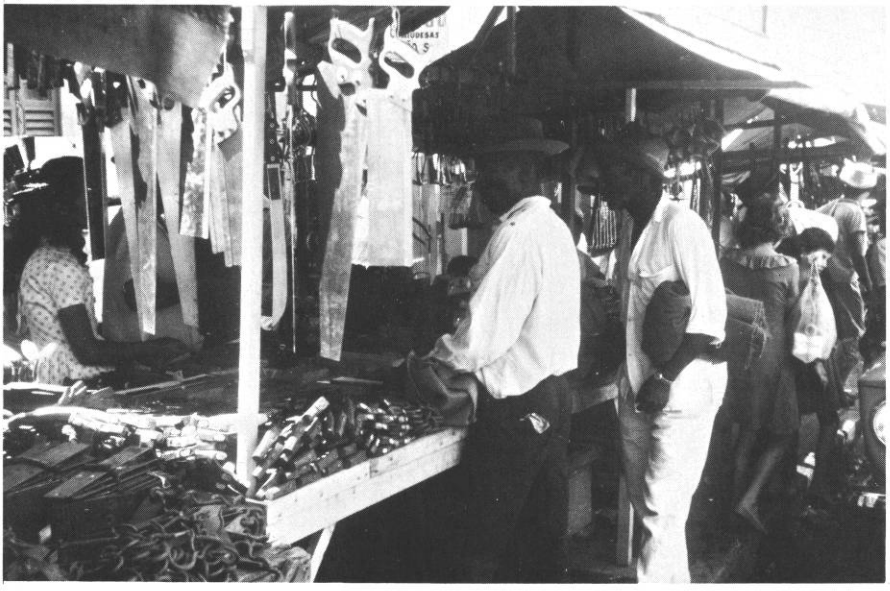
Shoppers in a modern supermarket (Bom Preço) buying traditional foods (rice, beans, manioc flour) in consumer-sized packages. (Recife)



Farmers hauling beans to village market. (Alagoas)



Loading fresh vegetables for transshipment from a rural assembly market to Recife. (Vittoria, a trading center in the state of Pernambuco)



Farmers buying hand tools at the weekly *feira* in Caruaru, Pernambuco.



Peeling manioc roots--the first step in the processing of manioc flour at a mill located in Pernambuco.

CHAPTER 1

INTRODUCTION

Purpose of Study

This report summarizes a diagnostic study of the marketing system linking a large urban center in Northeast Brazil with the rural area providing most of its food supply. There were two major purposes for the study: one was to describe and analyze the existing marketing system in Northeast Brazil as a basis for formulating improvement recommendations that would contribute to regional development goals; the other was to contribute to a more useful conceptualization of market processes in economic development.

The study was conducted by a joint task force composed of technicians from SUDENE, the Northeast Brazil planning and development agency, and staff members from Michigan State University.[1] The work was financially supported by AID/Washington with additional funding through Brazilian counterpart funds.[2]

The project was focused on Recife, a regional urban center of about one million people, and on the nine-state area which makes up the northeastern region of Brazil. The total population of the Northeast is about 27 million, with two-thirds living in rural areas. The Northeast continues to be one of the poorest areas in Brazil, with annual income averaging between $100 and $150 per person.

The regional development plans prepared by SUDENE have given primary emphasis to infrastructure and to sectoral efforts to expand agricultural and industrial production. However, the Third Master Plan (1966) made explicit recognition of the need for greater emphasis on marketing. The concern for marketing was further expanded in the Fourth Master Plan (1968).

The convergence of Brazilian and AID interests in marketing served as the basis for the initiation of the project described in this report. This chapter summarizes the conceptual background for the program and organization of the research activity.

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[1] See Acknowledgements, p. iv.

[2] See Foreword, p. iii.

Market Processes in Economic and Social Development

The exchange system and related market processes take on increasing importance as a traditional agrarian society is transformed into a modern industrial society. The increasing proportion of the population living in urban centers and rising levels of incomes require more highly organized channels for processing and distributing agricultural products. Also, as agriculture becomes more specialized and adopts modern production methods, there is an increasing flow of industrially produced inputs from the cities to the countryside. The increasing interdependence of major sectors of the economy, such as agriculture and industry, requires an effective system of exchange to coordinate production and distribution activities.

Economic Viewpoints on Marketing and Development

The marketing system is the primary mechanism for the coordination of production, distribution and consumption of goods and services. From an economic viewpoint, marketing includes the exchange activities associated with the transfer of property rights, the physical handling and transformation of products, and the institutional arrangements for facilitating these activities. But market processes are embedded in the larger social system.[3] Communication linkages and the related information flows are critical to the coordination of the production and distribution of all goods and services. Also, buying and selling activities become an important part of social processes, especially in less developed societies, where local market places are often important centers of social interchange.

Economists oriented to the workings of the perfectly competitive market model have tended to attribute a passive role to "marketing" as part of the economic development process. The relative neglect of marketing by economic planners was noted by Holton in the early 1950s. He pointed out the incentive role of marketing and suggested that if market channels were less tortuous and less costly to navigate, more goods might flow through them.[4]

---

[3] Allen Schmid and James Shaffer, "Marketing in Social Perspective," *Agricultural Market Analysis*, ed. Vernon Sorenson (East Lansing: Bureau of Business and Economic Research, Michigan State University, 1964), ch. 2.

[4] Richard Holton, "Market Structure and Economic Development," *Quart. Jour. Econ.*, vol. 67 (August, 1953), pp. 334-61.

J.C. Abbott has also argued that national planning techniques for improvements in marketing is a neglected subject. Getting integration of the expansion of market facilities with expansion of production is vital for sustained momentum. In part, this neglect may reflect a traditional reluctance to enter into the details of marketing on the part of general economists who still carry over the classical view that production is what matters--consumption is mainly a question of income distribution.[5]

Collins and Holton have questioned the validity of assuming that marketing firms will automatically spring up in response to price incentives and provide effective linkages between producers and the ultimate consumer.[6] These authors contend that distribution can play an active role in economic development by changing demand and cost functions in both agriculture and manufacturing in a way favorable to expansion. They advance several reasons why they believe that the distribution sector may not respond to market incentives. These are summarized below:

1. The absence of grading systems, standard weights and measures and an adequate legal code covering contract rights and obligations complicates negotiations between buyers and sellers. This limits the scale attainable by a firm with a given amount of managerial resources.

2. The price mechanism alone may not induce the individual firm to establish certain auxiliary services, such as the provision of market information, because the benefits diffuse among the entire industry. Hence, the profit account of the initiating firm may not accurately reflect the gains from the service.

3. Private entrepreneurs may be blocked from adopting significant innovations either because the initial investment required is too large relative to their credit sources, or because they may prefer the status quo to the uncertainties of innovation.

4. A shortage of managerial resources may cause successful merchants to invest, not in distribution changes, but in real estate, foreign securities, or other investments. Not only do these investments make more limited demands on their managerial time, but risks are also diversified.

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[5] J.C. Abbott, "The Development of Marketing Institutions," *Agricultural Development and Economic Growth*, ed. Herman Southworth and B.F. Johnston (Ithaca, New York: Cornell University Press, 1967), ch. 10, p. 393.

[6] N.R. Collins and R.H. Holton, "Programming Changes in Marketing in Planned Economic Development," *Kyklos*, vol. 16, January, 1963, pp. 123-34. (Reprinted in *Agriculture in Economic Development*, ed. Carl Eicher and L.W. Witt (McGraw-Hill, 1964).

5. Potential innovators may be discouraged because imitators may enter the industry and quickly beat down margins before the innovator can recoup his initial investment or outlay. In addition, the innovator may have control over only a limited portion of the distribution channel, while, for his innovation to be effective, it must be coordinated with changes in other stages of the marketing process.

6. Complicated licensing procedures and closed socio-economic groups collectively resist competitive intrusion by firms such as supermarkets, which represent a significant and threatening innovation.

7. The automatic transformation of the marketing system may be impeded if distribution enjoys greater economies of scale than production. In this event, the proper kind of distributive system may not develop until the new pattern of production has already been established. In turn, the establishment of a new production pattern may depend on the existence of the right kind of distributive sector.[7]

Collins and Holton also suggest that public policy may need to provide the necessary devices to transform an interrelated production-distribution system. Development plans which do give attention to agricultural marketing problems too often emphasize simple cost-reduction devices or call for improved physical distribution facilities. Such development plans do not seem to fully appreciate the degree to which externalities affect the marketing process. The marketing firm is vitally affected by organizational, operational and institutional changes among its suppliers as well as customers. Thus, changes in the economic structure of its supply industry (or demand sector) may have significant implications for the individual marketing firm. Similarly, the size and conduct of competing marketing firms can be an important factor determining actions of individual market operators. Finally, the many actions of the public sector have an important external effect on all sectors of an economy, including the marketing sector.

Specifically, the rules of exchange, the regulation of competition, and the nature of the marketing infrastructure (transport facilities, storage, etc.) are important external factors affecting the over-all organization of the marketing system. The critical need, then, seems to be the design of development plans which recognize and use such externalities in creating a kind of chain reaction in the marketing system which will lead to the kind

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[7] *Ibid.*, pp. 363-366.

of organizational and operational improvements among marketing firms that will contribute to over-all economic growth.

The importance of marketing in agricultural development has also been explicitly recognized by other development authorities. In a recent report to the President of the United States on the world food problem, a group of outstanding scientists made the following observation:

> The improvement of food storage, processing and distribution systems in the developing nations is as important as increasing production. The encouragement of private investment to develop facilities for storing, processing and distributing goods deserves a high priority. Governments of developing countries must provide a climate hospitable to the kinds of private enterprises that can stimulate change from a subsistence-oriented farming economy to a market-oriented one.[8]

J.C. Abbott has further detailed some of the recent views on the importance of marketing in agricultural development. He writes as follows:

> (1) Cash returns to producers depend on their goods reaching a consumer. So the success of a project to change a physical production pattern depends on an effective organization to bridge the gap between the producers and the consumers. This gap may be of varying width and complexity.
>
> (2) Detailed market knowledge and research is essential in determining which products to grow and which varieties of these products. Other marketing factors--ease of handling, durability in transport, suitability for processing--also have to be taken into account.
>
> (3) The cost of marketing can cancel out efficiency in production. No matter how suitable an area may be for production and how acceptable the product in consumer markets, if the cost of getting it to those markets takes too high a share of the final price, then production may be uneconomical except on a subsistence basis. Excessive losses in transport to the market, heavy investment and operating costs of equipment and organization to reduce such losses, and high margins and risk allowances due to an inefficient marketing structure are some of the more obvious cost obstacles.
>
> (4) Greatly improved marketing organizations may be essential to take full advantage of favorable production opportunities. In many situations there is a need not so much to reduce the cost of marketing as performed at present, but to develop more elaborate and comprehensively organized marketing systems. For fresh fruits and vegetables, for example, these must

---

[8] Report of the Panel on the World Food Supply, President's Science Advisory Committee, *The World Food Problem* (Washington, D.C.: U.S. Government Printing Office, 1967).

often include uniform and precise grading, packing, temperature control in transit, timing and adjustment of total quantities delivered to particular markets, and consistent and thorough sales promotion.

(5) Distributive organization to furnish production supplies and consumption requirements is also needed. If fertilizer, insecticides, farm machinery and tools are not readily available at low cost, the agricultural production targets on which a project is based may never be attained. If a suitable range of consumer goods is not obtainable conveniently and inexpensively, then settlers accustomed to a fairly high level of living are likely to be dissatisfied and to come under family pressure to leave the project area. Where settlers come from near-subsistence environments, maintenance of an attractive and varied display of consumer goods at a range of prices can be a major stimulus to productive effort. There may be little incentive to obtain income beyond subsistence needs where the prices of the next rank of consumption items seem very high or the goods which normally occupy the next rank--textiles, domestic hardware, cheap jewelry and ornaments--are unknown and unavailable.[9]

Marketing and Social Process

Market processes are intimately linked with factors which extend beyond traditional economic concerns into the cultural and psychological makeup of market participants, their social structural relationships, and their communication behavior. In general, these concerns can pose formidable barriers to achieving economic gains, and hence are among the important foci of market system diagnosis and reform recommendations. Some of these concerns are:

1. Literacy, which is usually at low levels in developing countries, particularly in the rural areas. The inability to use printed messages (which are more storable and retrievable than radio broadcasts or other messages) can seriously hamper the transfer of new ideas and technology or the learning of existing techniques by new entrants into the system.

2. Achievement desires, which are typically depressed in most developing countries. Part of this lack of achievement orientation may be due to a rational appraisal of the environment; or it may be focused on the achievement of other than economic goals, e.g., acceptance by others.

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[9] J.C. Abbott, "Marketing and Area Development Studies," *Toward Scientific Marketing*, ed. Stephen A. Greyser (Chicago: American Marketing Association, 1964), pp. 425-426.

3. Cooperativism, which is a necessary ingredient in tackling projects beyond the scope of individuals. A lack of cooperativism hinders the coordination and integration of actions required to clear new areas of land, combining purchasing to achieve lower unit costs, etc.

4. Fatalism, or the set of beliefs indicating that the environment is beyond the individual's control. Hence, there is little reason to try to cope with or manipulate one's environment. Instead, what is needed is a belief that one can improve one's lot in life and a corresponding willingness to attempt new ways of thinking and behaving.

5. Innovativeness, or the tendency to choose different and potentially improved practices and utilize them successfully in personal economic life.

6. Mass media, which are a principal means of conveying economic information, knowledge about consumer goods and details of life styles in the large society. In many developing countries there is a lack of mass media availability and the media are seldom efficiently used to foster market coordination.

Using considerations such as those described above, it is important to examine many of the perceptions and predispositions of market participants. At the same time, environmental conditions must be objectively appraised, and then compared with the views of market participants. Where environmental conditions seem to be accurately perceived, it is clear that these conditions may well have to be changed before it is reasonable to expect the market participants to change. However, where there is a discrepancy between environmental conditions and the perception of market participants (e.g., where credit is available but goes unutilized because of lack of knowledge, unwillingness to go into debt, etc.), then it is important to exercise the appropriate communication linkages and reduce this discrepancy.

Marketing and Economic Development Goals

The performance of marketing processes can only be evaluated against the economic, social and political goals of a particular society. These goals are difficult to identify in a clear, objective

manner. However, as a general orientation for comparative studies of marketing systems in Latin America, four economic development goals have been selected to give direction to the diagnostic studies. They are as follows:

1. Gross product growth--Most Latin American countries have established target growth rates of at least 5% annually in total product and 2-1/2% per capita per year.
2. Full employment of labor--Since most less developed countries experience high rates of underemployment, development programs must constantly be examined in terms of their effect on employment.
3. Rising levels of productivity--The achievement of satisfactory gross product growth rates and rising levels of real income per capita require the adoption of new technology and new organizational methods to raise productivity.
4. Less concentrated distribution of income--This goal not only contributes to greater social and political stability, but also to the acceleration of economic growth as purchasing power is shifted toward individuals with higher propensities to consume.

The ways that marketing reform programs can contribute to the achievement of these goals are explained in the following section.

Towards a Market Orientation in Development Strategy

National Market Integration

Walter Rostow's proposal for a national market integration approach to the development of Latin American countries provides a relevant orientation for this project.[10] Rostow has made the following diagnostic observations describing conditions in these countries:

> First, there is some industrial capacity, usually developed to substitute for the import of certain kinds of consumers' goods. . . . This both saves foreign exchange and permits industrialization to begin, and it is no great trick to market for a rich urban middle class.

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[10] W.W. Rostow, *View from the Seventh Floor* (New York: Harper and Row, 1964), pp. 133-35.

> The second characteristic of these countries is that, leaving the textiles aside, the market for these manufactured goods is small; and there is a tendency for industrialization to slow down once the substitution for imports has mainly taken place.
>
> A third characteristic of such countries is that, although some agricultural development is taking place, the gap between rural and urban life is widening.
>
> Finally, as a result of this imbalance, men and women move from the countryside to the cities, where often they remain unemployed and impose a burden on government budgets for housing, education, and so on, even though they live in urban slums.

Rostow concluded that what is needed is a strategy for "national market integration." He has specified four interrelated elements that should be incorporated into a market-oriented development program. These elements are:

1. A buildup of agricultural productivity.
2. A revolution in the marketing of agricultural products.
3. A shift in industrial output toward simple agricultural inputs and cheap consumer goods for the mass market.
4. A revolution in marketing methods for manufactured goods, especially in the rural areas.

It was Rostow's opinion that this program should be accomplished through a combination of public and private efforts. However, the specific means for accomplishing these program elements were left for further elaboration and adaptation to the environmental conditions of particular countries. This became a principal concern of the studies carried out by Michigan State University under contracts with AID.

Market Development Strategy

The first phase of the MSU/AID research program was a pilot study in Puerto Rico to examine the role of food marketing improvements during a period of rapid economic development. The observations and conclusions from this study contributed to the conceptualization of a market development strategy within the context of a comprehensive approach to development planning.[11] This conceptual framework is described below.

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[11] C.S. Slater and H.M. Riley *et al.*, *Food Marketing in the Economic Development of Puerto Rico*, Latin American Studies Center Research Report No. 1, Michigan State University (East Lansing, 1968 [in process]).

A conceptualization of a market orientation to development strategy requires further identification of the problem. This problem setting can be summarized in the following manner. In less developed countries the production and distribution of locally produced staple foods is usually carried on by a large number of small firms using traditional technologies. Also, in the poorer communities, food makes up from one-half to two-thirds of consumer expenditures. Productivity of human effort is low; hence, incomes and levels of living are low. Although individuals may be motivated to try to improve their incomes and living conditions, they are constrained by their economic, social and cultural environment. Associated with these environmental constraints are low levels of knowledge and poor communication. Hence, the production-distribution systems are usually poorly coordinated and to an outsider appear wasteful and inefficient. However, this state of affairs may be the consequence of rational decisions by individual market participants who are substantially constrained by the high levels of risk and uncertainty existing in both product and factor markets.

In addition to uncertainties associated with the physical aspects of an innovation, such as technical feasibility, weather factors, ability or knowledge to "make the innovation work," etc., there are usually significant uncertainties arising within the marketing system. Hence, the potential user of an innovation must consider uncertainties of the new input's availability and its cost relative to its expected returns. On the other hand, he is faced with price uncertainties for the product he produces. As a result, the typical businessman or farmer with low income and little capital reserve is reluctant to accept the risks associated with the adoption of innovations. Brewster has explained this behavior as follows:

> So close is life to the bone that their impulse to take a chance on gaining a whole loaf from new and untried techniques is inhibited by anxiety over losing the crumb they feel sure of getting from their old practices. And this progress-blocking anxiety stems from sound economic sense. For innovations carry an immense risk for the uninitiated, and the risk is magnified by the very poverty they might escape by taking it. Operating at a bare subsistence level, a crop failure or a failure to cover the borrowed money by added harvests would be calamitous.[12]

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[12] John M. Brewster, "Traditional Social Structures as Barriers to Change," *Agricultural Development and Economic Growth*, ed. Herman M. Southworth and Bruce F. Johnston (Ithaca, New York: Cornell University Press, 1967), pp. 67-68.

Thus, a preliminary diagnosis of market coordination problems in less developed countries suggests that a low productivity, low income "equilibrium" exists.[13] To increase productivity and raise incomes will probably require major efforts to introduce new technologies and new institutions that would start a series of adjustments toward a higher output and more productive system.

An over-all strategy that includes four entry points into the system is suggested by the conceptual approach developed in this project. One entry point is the urban food distribution system, a second is the rural markets for assembly of agricultural products, a third is the distribution of agricultural inputs and a fourth is the urban industrial system. The rationale for these strategy elements was based upon a detailed review of the literature and on the results of the first phase of this project which was conducted in Puerto Rico.[14]

Figure 1.1 is a conceptual illustration of how a series of interrelated marketing reforms can stimulate economic growth. In this example, one of the initial entry points is a program to reduce food marketing costs through improvements in the urban food distribution system with complementary reforms in the rural assembly markets for locally produced foodstuffs. The dynamic adjustments which might result from this marketing reform program are described below.

The traditional small-scale and rather poorly coordinated urban food distribution system might be transformed into a more efficient system through loans and technical assistance to private operators, accompanied by an appropriate consumer education program. A suggested strategy, based upon observed changes in both Puerto Rico and Recife, Brazil, is to foster the establishment of a few large volume, low margin supermarkets able to reduce retail prices on staple foods through more efficient procurement and handling procedures. These larger retail outlets can also place additional downward pressure on prices of staple foods by following a pricing policy of low margins on these items while charging higher margins for other food and non-food items. Such a differential pricing policy favors the low income families who must limit their food expenditures almost entirely to low-cost staples.

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[13] This is a parallel observation to that made by T.W. Schultz in his book, *Transforming Traditional Agriculture*, Yale University Press, 1962.

[14] Slater and Riley, *loc. cit.*

Figure 1.1 A Strategy for Reforming Marketing Processes

A SEQUENCE OF CHANGES IN THE MARKETING PROCESS	PRIMING ACTIONS SEEMINGLY NEEDED TO FOSTER DEVELOPMENT	POINTS OF ENTRY
INCREASE URBAN INCOMES Reduce marketing costs for locally produced food products Lower food prices Increased demand for food Increased food production Increased rural incomes Increased demand for farm inputs from urban areas Increased rural demand for urban produced consumption goods	Capital and technical assistance to urban marketers to foster: 1. Discount supermarkets 2. Improvement in efficiency of traditional food marketing systems 3. Employment opportunities for urban marketers displaced by above reforms. Foster backward vertical coordination of food marketing Capital and technical assistance to rural assemblers & transporters Improve public storage, roads, exchange rules, grades, etc. Improved market information systems Price stabilization programs Supervised credit programs Increased extension of technical information on agricultural production Improved farm input distribution Improved rural consumption goods marketing	Urban food distribution system Rural assembly market systems Rural distribution system for farm inputs and consumer goods Industrial sector

After the initial impact of the large discount supermarkets, the reduction in retail food prices can be extended to a larger segment of the urban market through programs to improve the efficiency of traditional food marketing firms. The effects of the larger markets will create a competitive reaction among smaller store operators and wholesalers, who will then respond more favorably to programs to assist them in improving their methods of operation.

Since food expenditures usually make up more than one-half of total family living expenditures in urban areas of less developed countries, a reduction in food prices can have a significant effect on "real family income." In such a situation, a 10% reduction in food prices could increase total purchasing power (real income) by 5% or more. The result would be an increase in "effective demand" for both food and non-food products.

One effect of this program, which reduces prices of staple foods, would be to shift the relative flow of income toward low income families who have higher propensities to consume and low propensities to save. What, then, is the effect on investment? Does this tend to reduce the savings of higher income families? It seems likely that the increased spending by low income families would generate rising levels of demand and greater internal investment within firms whose profit accounts are favorably affected. This induced investment would probably have more desirable effects on economic development than if high income consumers did not lose some of their potential savings through the differential pricing policies of large-scale retail food outlets. There is an implicit assumption that the savings of high income consumers would tend to be held in idle bank accounts, or invested in real property as a hedge against inflation.

In the short run, the income effects of reduced retail food prices would bid up the wholesale prices of available food and non-food products. The increased demand for food would then be reflected back through rural assembly markets to farmers, who would be stimulated to expand output. This would tend to increase farm incomes and expand rural demand for industrially produced farm inputs (fertilizer, insecticides, machinery, etc.) and consumer goods (clothes, medicines, household equipment, etc.). The increased rural demand for industrial products would add to increased demand by urban consumers, who would also seek to purchase manufactured items with part of their increased real income resulting from lower food prices.

In the longer run, the increased use of modern, industrially produced agricultural inputs and related technical advances in farm production practices would lead to expanded output, lower production costs and reduced product prices. Similarly, adjustments in industry would tend toward the adoption of capital intensive technologies, rising levels of wage payments, rapidly expanding output and an increased variety of products. During this development process a smaller proportion of the population would be needed in agricultural production, thus resulting in heavy migration from the rural areas to the cities where they would seek employment. This points up the need for a development strategy which emphasizes a balanced approach with careful attention to stimulating a dynamic interaction between the rural and urban areas. The strategy is to break the low-level equilibrium condition and create a chain reaction of economic adjustments which lead toward the desired development goals.

The particular strategy described above emphasizes improvements in the assembly and distribution system for basic, locally produced food products. The initial impact was to increase effective demand by reducing food prices, especially to the lower income families.

A case can also be made for market reform programs which are initially directed toward improvements in the rural assembly markets. Improvements in physical facilities for transporting, storing and processing agricultural products can reduce food marketing costs and stimulate economic growth. Improved information systems and government price stabilization programs may also reduce uncertainty and lower production and distribution costs. These kinds of market improvements would stimulate efficient use in the agricultural production-distribution system which will be ultimately passed on to consumers through lower food prices.

In national or regional economies where substantial quantities of food are imported, it may also be possible to reduce food prices and increase economic activity by the introduction of new agricultural technologies. A desirable sequence of changes could be triggered by marketing reforms which increase the availability and reduce the costs of industrially produced farm inputs such as fertilizer, machinery and insecticides. Increased demand for these industrial products would, in turn, increase employment in the industrial production and distribution system, thus expanding demand for food and other products.

A word of caution should be noted, however. Unless there exists the possibility for local production to displace food imports or to initiate exports, a program which emphasizes a technological revolution in agricultural production may quickly lead to sharp declines in product prices as increased output meets the relatively inelastic consumer demand schedules.

A fourth entry point for initiating marketing reforms is through an industrial development program oriented toward the production and distribution of low-priced consumer goods and simple agricultural inputs. However, development achievements might again be severely limited by the constraints of consumer purchasing power.

The above arguments lead to a tentative conclusion that a comprehensive and coordinated market reform program is required to stimulate effective interaction between rural and urban areas. The interrelationships of the agricultural and industrial sectors emphasizes the need for improved market linkages that will facilitate an upward spiral of economic activity.

The above arguments suggest that economic development can be induced by marketing reforms which significantly reduce the risks and uncertainties confronting market participants, thus increasing their willingness to expand output, to adopt more productive technologies and to submit to regulations or institutional changes which increase economic opportunities. The suggested approach to market development planning is to conduct comprehensive diagnostic studies of the marketing system in specified geographic areas. These studies provide needed descriptions of the existing marketing system and assist in identifying the economic and social barriers to modernization. Systematic surveys of market participants can provide useful information on economic organization, communication activities and respondent attitudes toward environmental conditions and possible changes in marketing institutions. These studies can provide the information base from which institutional reforms and the judicious injection of capital along with technical assistance can be focused upon the market barriers to the achievement of development goals.

The Northeast Brazil Study

The conceptual framework discussed earlier in this chapter served as a guide in formulating the research program in Northeast Brazil. The Memorandum of Agreement, which was jointly developed

by SUDENE and Michigan State University staff and approved by the USAID Mission to Northeast Brazil, specified the scope and content of the program.

The operational objectives of the program were as follows:

1. To conduct a diagnostic study of the existing marketing system for food, selected agricultural products, farm inputs and selected locally produced consumer goods.
2. To formulate recommendations for improvements in the marketing system based upon the diagnostic studies.
3. To develop systematic procedures for evaluating selected potential marketing reforms and arriving at policy decisions.
4. To evaluate hypotheses and draw conclusions about the role of marketing in economic development.
5. To provide research training for the Brazilian and Michigan State University project staff.

The geographic focus was narrowed to Recife and the rural area which serves as a primary source of locally produced agricultural products. Five commodities were selected for detailed investigation in the rural areas. Rice, beans and manioc were selected as staple food items that are widely consumed throughout the Northeast and also rank high as sources of farm income. Milk was taken because of its potential importance in the improvement of nutrition, especially among children. Available information also indicated that the urban milk distribution system was a major obstacle to expanded consumption. The fifth commodity taken was cotton, which is one of the two most important agricultural crops in the Northeast, the other being sugar.

There were five phases of work. The first was the preliminary investigations, including review of previous studies, interviews with public officials in agencies involved in marketing, direct observation and detailed interviews with market participants and collection and examination of secondary data. These activities provided a basis for a more detailed plan of work. Phase Two was the planning and execution of detailed structured interviews with systematic samples of market participants. The sampling and survey procedures are summarized in Appendix A and are briefly outlined below.

Consumer survey in Recife

An area cluster sampling technique was used to select a representative sample of households. Three hundred and fifty-four questionnaires were completed from a sample of 390 households.

Retailer-wholesaler survey in Recife

Representative samples of retailers and wholesalers were surveyed within five strata (Table 1.1).

Follow-up depth studies were conducted with 62 randomly selected store operators among those interviewed earlier. Special price studies and in-store interviews with consumers were also conducted.

Farmer surveys in the Recife foodshed

Systematic sampling techniques were used to select representative samples of farmers producing cotton, beans, rice, manioc and milk in *municipios* identified as important suppliers for the Recife urban market. The producer samples were drawn from the lists of property owners assembled by IBRA, the Brazilian Land Reform Institute. The sample of milk producers was randomly selected from lists of producers shipping milk to the only milk pasteurizing plant in Recife (Table 1.2).

Farm input distributers

In the areas where farmers and assemblers were interviewed, an effort was made to interview all farm input distributors.

Commodity assemblers

A stratified random sample of 169 assembly market operators was interviewed. The assemblers were operating within areas where the farm interviews were conducted.

Industrial surveys

Eighty-five firms were interviewed with questionnaires requiring from two to four hours to complete. Three industry groups were studied: (1) food processing, (2) agricultural inputs, and (3) household consumer goods.

These interviews of market participants were conducted by specially trained advanced students from the faculties of Economics, Administration, and Social Science of the Federal University of Pernambuco.

The field questionnaires were coded and the information was transferred to IBM cards in Recife. Preliminary analysis was done on the IBM 1401 computer in the Recife data processing installation operated by IBM. Magnetic tapes were prepared and subsequent analysis was conducted on the Michigan State University CDC 3600 computer in East Lansing, Michigan.

In December 1967, a draft report was completed by the SUDENE/MSU project team and submitted to the Superintendent of SUDENE and the Director of USAID/Northeast Brazil for preliminary evaluation

Table 1.1 Sample Survey of Retailers and Wholesalers in Recife

Strata	No. in Sample	No. of Questionnaires
Stall operators in *feiras*	235	210
Fixed *feira* operators	80	75
Public market operators	115	100
Small store operators	459	447
Large store operators	44	43
Consumer cooperatives	11	11
Large meat dealers	5	5
Large food wholesalers	77	70
Public market and fixed *feiras* wholesalers	74	66
TOTAL	1084	1027

Table 1.2 Sample Survey of Farmers in Northeast Brazil

Commodity	Location of Area	No. of Interviews Completed
Rice	Alagoas & Sergipe	127
	Maranhão	27
Beans	Alagoas & Pernambuco	128
	Bahia	49
Manioc	Pernambuco	151
Cotton	Paraiba & Pernambuco	165
Milk	Pernambuco	126
	TOTAL	746

and comment. That draft report was based on incomplete data analysis and was released only to SUDENE and USAID in order to obtain their comments, which would be helpful in preparing the final project report.

The present publication is based on the draft report but incorporates a large number of detailed suggestions submitted by USAID/NE and by the Department of Agriculture and Supply of SUDENE. It also reflects six months of full-time work by the entire Michigan State University staff assisted by two SUDENE representatives. The final data analysis and report revisions were carried out at Michigan State University, where the project staff could have daily access to the computer facility.

Organization of the Report

The present chapter has reviewed the role of the marketing system in the economic development process and has provided a conceptualization of the sequence of events through which public investments promote economic growth. This chapter has also summarized the methodology used in the research. The remainder of this report is devoted to an examination of the marketing system for Recife and its foodshed in the light of the conceptual framework presented in this chapter.

Chapter 2 focuses on the historical background of the Northeast and the development of special agencies and organizations for promoting economic development in the region. This chapter is intended primarily as a review of the historical evolution of important development institutions in the Northeast and their approaches to the development problem. This chapter should be of particular interest to the reader who is not familiar with the history of the Northeast.

Chapters 3 through 5 present the detailed description and diagnosis of the industrial production and distribution sector, and the urban food distribution sector for Recife, respectively, Chapter 6 then draws on these observations to present a series of recommendations for urban market reforms.

Chapters 7 through 10 provide similar description, diagnosis and recommendation for the rural production and marketing processes for selected products in the Recife foodshed.

Chapter 11 is devoted to an explanation of the Recife Systems Simulation Model which was developed as a tool for analyzing the complicated effects of postulated development programs on the economy of the Northeast.

Chapter 12 provides a summary of the issues, conclusions and recommendations reported in earlier chapters.

The final chapter goes a step further toward considering some of the problems of implementing the report's recommendations and toward the preliminary evaluation of the potential impact of some postulated reform programs on the economic development of the region.

Note: All monetary values used throughout this report are based on an exchange rate of US$1.00 = NCr$2.70, the exchange rate which was in effect when the studies were made.

CHAPTER 2

THE DEVELOPMENT SETTING: NORTHEAST BRAZIL

Operational research on development processes is necessarily performed in a developing society. The physical, cultural, economic and political milieux constrain the research design and execution. The over-all research environment also influences the formulation and implementation of the recommendations derived from the research. The purpose of this chapter is to acquaint the reader with the particular development setting of Northeast Brazil within which the SUDENE/MSU research has been conducted.

The chapter: (1) reviews the region's geography and economic history; (2) traces the evolution of Brazil's policies and efforts to deal with the development problems of the Northeast, including the creation of SUDENE and its activities; and (3) describes the principal government agencies which are involved in the region's marketing processes. From our review of the development setting, a number of important observations emerge regarding the relationship of the SUDENE/MSU marketing research to the current stage of development policy formulation in the Northeast. These observations will be summarized at the outset of this chapter.

Summary of Basic Findings

Review of Northeast development history leads to some fundamental observations.

First, the SUDENE/MSU marketing research includes consideration of two critical problems in Northeast development: (1) the creation of effective demand for the products of the region's industrial sector, and (2) the equitable distribution of income among the region's inhabitants. The former of these problems was originally raised by the Brazilian economist Celso Furtado in his groundbreaking 1958 study of the Northeast economy.[1] Furtado noted that the high levels of real food prices in the region's cities implied that consumers had little to spend on manufactured products, and therefore, that the effective demand for industrialized consumer

[1] Furtado's work was published in 1959 as "A Policy for the Economic Development of the Northeast," by the Northeast Development Council, CODENO, a precursor of SUDENE.

goods (including processed foods) was severely limited. For industrialization to proceed at a satisfactory rate, he argued, real food prices in urban areas must decline.

The equitability of income distribution among the Northeast population became an explicit and primary concern of development policy with the publication of SUDENE's Third Master Plan in 1965. The authors of the Third Plan emphasized that income distribution was an issue of social welfare (and implicitly, therefore, of political stability) and was also related to the growth of markets for the products of regional industry.

The SUDENE/MSU marketing research has led essentially to a restatement, elaboration and refinement of the effective demand and income distribution problems. So as to be recognizable to those who are familiar with the development history of the Northeast, two of the key questions investigated by the SUDENE/MSU team may be formulated as follows:

1. How can the simultaneous, mutually reinforcing growth of both agriculture and industry be promoted through improvements in the marketing systems which link these sectors?

2. How can additions to regional income, brought about by the expansion of output and improvements in productive and marketing efficiency, be distributed favoring the lower income groups of the regional population?

In the chapters which follow, these questions are investigated in depth from the viewpoint of marketing system dynamics. The SUDENE/MSU study thus constitutes a fresh conceptualization of several basic problems of Northeast development. It is also a more rigorous analysis of these problems, since it takes into account more systematically, comprehensively and quantitatively the relevant variables and functional relationships between variables.

Although the research jointly performed by SUDENE and MSU has led to several new approaches to the critical problems of Northeast development, its recommendations also build upon the current policies and programs of SUDENE and other development agencies in the region. As will become evident in subsequent chapters, the marketing viewpoint of analysis allows present development activities to be seen in a new light, and also clarifies the need for modifications in these activities and the addition of some activities to the arsenal of regional development programs. Change and redirection are needed, but much of what is now being done to stimulate regional development can usefully be continued.

In short, the SUDENE/MSU research can accurately be regarded as a current phase in the evolution of thought regarding the nature of Northeast development problems and ways of dealing effectively with those problems. The results of the research are not products of pure theory, nor of the attempt to transplant wholly foreign ideas to the setting of the Northeast. The research is constructed squarely on the contributions of Brazilians to the definition and understanding of Northeast development problems. It is closely aligned with the process of development policy formulation in the Northeast under the leadership of SUDENE. The recommendations to which it has led have been formulated giving careful consideration to institutional and other resources and constraints of development in the Northeast.

Geography: Land and People

The northeastern region of Brazil is generally regarded now as coincident with the SUDENE area of jurisdiction. As such it is comprised of nine states and a small part of a tenth. The northernmost state, Maranhão, lies just below the equator. Bahia, on the under-side of the Northeast "bulge," extends southward almost to the 20th parallel. Each of the nine states which lie entirely within the region has an Atlantic coast. Only a few northern municipalities of Minas Gerais, a land-locked state, are within the SUDENE area of jurisdiction. The region is approximately bounded on the west by the 47th meridian (see Figure 2.1).

Although the Northeast accounts for only 10% of Brazil's total land surface, it is larger than the combined areas of France, Italy, Spain and Portugal (Bahia alone is larger than France). One out of three Brazilians lives in the Northeast. In Latin America, only Mexico has a comparable population.

Four relatively distinct sub-regions are encompassed by the Northeast. Within each sub-region, however, there is significant variation in topography, climate and land resource base and use.

From the city of Salvador along the coast to the upper edge of the state of Pernambuco lies a narrow humid strip known as the Zona da Mata, or "Forest Zone." Remnants of the dense high stands of tropical trees which originally covered the sub-region can still be found. But most of the forest was felled during the Colonial Period to make way for cane plantations and to build and run the sugar mills. The re-growth is still used primarily as a source of fuel in the sugar industry.

Figure 2.1 Geographic Zones and States in Northeast Brazil



The Forest Zone is blessed with the region's most abundant and regular rainfall, and also contains most of the better soils. The humid strip is 30 to 40 miles wide, broadest in Pernambuco, where it extends inland from 50 to 60 miles. The southern area in Pernambuco is very hilly, but interlaced with numerous, relatively flat, shallow valleys. Below Pernambuco, the area is characterized by extensive tablelands cut irregularly by deep stream beds. The northern part of the Forest Zone in Pernambuco is also relatively flat. Above Pernambuco, the Forest Zone becomes discontinuous, and is encountered at intervals immediately adjacent to the rivers and streams along the coast.

Cane and sugar production on large estates has been the principal economic activity in the Forest Zone since the initial colonization of the Northeast. The food produced in the area is grown and consumed chiefly by the plantation and mill workers. In certain parts, pineapple and manioc are produced for urban markets. Commercial coconut production has also developed in recent years on the limited stretches of sandy soils just off the beach.

The Borborema Escarpment runs irregularly along the western edge of the Zona da Mata and delineates the beginning of the second major sub-region of the Northeast, the Agreste. The Agreste is a transition zone from the low-lying humid coastlands to the vast semi-arid interior plateau. It runs generally north and south, and is approximately comparable to the Zona da Mata in width.

Offshore weather formations rarely penetrate beyond the Agreste. Continental air masses determine weather westward. Rainfall is adequate to exclude most of the Agreste from the "Drought Polygon," but is less bountiful than that experienced in the coastal sub-region.

The Agreste is generally hilly and peppered with large rock outcroppings. Its soils are of relatively poor quality, but their structure and depth, together with the sub-regional climate, have allowed for substantial diversification of agriculture.

The Agreste is the Northeast's primary internal source of foodstuffs. Beef cattle are raised extensively on large holdings. From Pernambuco and the state of Alagoas just to the south, the sub-region supplies dairy products to the major urban markets. Beans, manioc, corn and rice--the staples of the Northeast diet--are typically produced under sharecropping arrangements or on the *"minifundia"* characteristic of the Agreste. Fruits and vegetables

are likewise produced for the regional market. The sub-region's agricultural output also includes important non-food crops, principally cotton and sisal.

Inland from the Agreste to the western extremities of the Northeast lies the Sertão. The notorious semi-aridity of the sub-region stems from a peculiar combination of climate and geology. Rainfall averages annually a total of about 27 inches. However, 90% of the precipitation is typically concentrated within the first five months of the year, leaving a dry season extending from June through December. An extremely thin soil cover over crystalline rocks which lack sedimentary beds results in scant water retention and high rates of evaporation. The torrential nature of the rainfall, together with the soil structure, accounts for widespread erosion and deep leaching.

Only two perennial rivers cross the Sertão; the others appear briefly during the rainy season, and then recede quickly below very shallow beds.

Drought is a yearly occurrence in the Sertão. The seriousness of the phenomenon depends on the volume of precipitation--which can vary up to 30% from the average--and perhaps more importantly, on the timing and relative concentration or dispersion of the rainfall throughout the year. Severe droughts result from particularly adverse combinations of the above two factors; their occurrence follows no regular cycle, but on the average is once per decade. They can be unrelieved for two to three successive years.

Vegetation on the Sertão is sparse. It consists primarily of indigenous, low-growing xerophilous plants. The economically valuable xerophytes are used almost exclusively in non-food industries or as cattle feed. *Mocó* (tree) cotton, *carnaúba* palm, the *oiticíca* tree, *coroa* and *palma* forage, and sisal are the most important.

The above-mentioned crops and beef cattle production on extensive holdings are the economic underpinnings of the sub-region. Range carrying capacity is low. The use of 10 hectares per head is not uncommon. In a few scattered parts of the Sertão the general landscape is briefly interrupted by combinations of climate and soil which allow for diversified agriculture closely resembling that practiced in the Agreste. The interruptions do not fundamentally change, however, the precariousness of life in the sub-region.

The fourth sub-region consists of the tropical rain forest areas of Maranhão and southern Bahia. These areas can perhaps more accurately be regarded as surviving extensions of the original Zona

da Mata type. The steady inroads of slash-and-burn agriculture, particularly in Maranhão, foreshadow eventual deforestation.

The population of the Northeast is concentrated along the Atlantic Coast. Eight of the state capitals are also port cities. The vast Sertão hinterland is the least settled.

Regional population has been growing steadily in recent decades at an annual net rate of between 2 and 3%, slightly below the national average. Precise data are lacking, but the difference between regional and national growth rates almost certainly results primarily from a steady migration of Northeasterners to the Center-South. Significant transfers of population have also been occurring within the Region.

Intra-regional flows have generally been from the rural Agreste and Zona da Mata to the urban centers. A study of migratory patterns converging on Recife, the largest of the Northeast cities, performed by the Joaquim Nabuco Institute, indicated a stepwise flow from the densely settled adjacent countryside to successively larger urban concentrations. The migrants from the Sertão seemed more likely to move out of the region southward.

Clearly, the influx to the coastal cities, particularly in the decade of the fifties, has been radically in excess of the demand for urban labor. The population of Fortaleza nearly doubled in that period; Recife's increased by an estimated 60%. Unemployment and underemployment, in varying degrees of severity, are visibly apparent in all of the cities bearing the brunt of the rural-urban transfer. The major municipalities have been extremely hard pressed to deal with the enormous burdens placed on water, sanitation, power, marketing and traffic systems, on housing facilities and on police and welfare services, by their burgeoning populations. Many of the newly arrived must struggle to exist with neither the expected amenities of urban life nor the relatively easy access to subsistence income which they may have left behind.

Much smaller streams of migration have been moving in the direction of Maranhão and the lower Amazon Basin, and also toward the sparsely settled Central Highlands of the states of Goias and Mato Grosso. During the late fifties, Northeasterners left in large numbers to joint the construction of Brasília. As their task has neared completion, demand for their labor has dwindled rapidly. The mobility of the region's population continues to be governed primarily by the hardships of life in the rural sector,

the contemplated attractions of the larger cities, and the prospect of jobs in the Center-South.

Economic History[2]

Either in fact or by historians' convention, Brazil was discovered by Pedro Cabral in 1500 on the Bahian Coast south of Salvador. The first permanent settlement, however, developed at Olinda, on a hillside north of the present city of Recife. Although thoughts of gold probably lingered in the minds of the first colonists (and were later to be borne out), the Portuguese were initially preoccupied with the establishment of a sugar industry. In terms of production techniques, they held a competitive advantage derived from considerable experience with the planting and refining of cane on the Atlantic island possessions of Portugal.

The geography of the Zona da Mata was found to eminently suit their purposes. But the ensuing task was by no means an easy one. The tropical environment was a formidable obstacle. The natives of the region were dangerous foes, difficult to round up and regiment, recalcitrant and thought to be relatively inefficient laborers. Food crops were somewhat less easily grown than sugar cane, and supplies of many major commodities had to be shipped from across the sea.

Still, cane and sugar production flourished. International markets were expanding rapidly, and through the mid-17th century the Northeast of Brazil had a virtual monopoly on world sugar exports. During the last quarter of the 1500s, output increased tenfold. At one point in the expansion process, it appears that the industry could have self-financed a doubling of output capacity every two years.[3] Northeast Brazil may well have been the most profitable colonization effort of any European power in the Western Hemisphere for the century and a half following Cabral's landing.

The dazzling economic upsurge had already begun to slacken, however, when the Dutch--at war with the Spanish annexers of Portugal--occupied the Northeast during the second quarter of the 17th

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[2]The summary of Northeast economic history is drawn primarily from Celso Furtado's book, *The Economic Growth of Brazil*.

[3]Celso Furtado, *The Economic Growth of Brazil* (Berkeley and Los Angeles: University of California Press, 1963), p. 49.

century. The occupiers left at the end of the quarter with hardly a shot being fired, but took with them to the Caribbean intimate knowledge of cane and sugar production processes. Moreover, the Netherlands had firm control over the commercial distribution of sugar in European markets. The Northeast's monopoly on sugar was rapidly broken as production increased in the Antilles and West Indies. Before the century ended, the economic fortunes of the region had been reversed. A long period of decline began.

Cattle production in the Northeast was originally a supply subsidiary of the sugar industry. Draft animals were required in practically every phase of the industry's operations. Since the expansion of cane production proceeded primarily by incorporating additional land, the demand for traction and transport beasts apparently increased more rapidly than the expansion of cultivated area. Moreover, the exceptionally high profitability of sugar production virtually precluded the production of other crops or of livestock in the Zona da Mata. Indeed, cattle raising in the Forest Zone was prohibited by edict of the Portuguese Crown.[4] As a result, livestock production spread widely throughout the Agreste and Sertão in the first 200 years of colonization.

The market position of Northeast sugar producers continued to worsen during the 18th century. In addition, the price of African slaves, who had largely displaced the indigenous captive laborers began to rise. The discovery of gold in the area of the present state of Minas Gerais attracted both capital and population out of the sugar area.

The problems besetting the sugar industry had adverse effects on cattle production, but the effects were mitigated. The fall in foreign exchange earnings from sugar motivated the creation of primitive import substitution industries along the coast; a market developed for hides and leathers produced in the region. Gold mining in the Minas Gerais region generated a new source of demand for draft animals, which apparently helped to improve prices for Northeast cattle. Finally, the operating capital requirements for livestock production were considerably lower than those of the sugar industry, fixed asset investments were comparatively nil, and declining employment in the sugar sector made cheap labor available to cattle raisers. Thus, over-all, livestock producers were in a fairly good position to weather the negative impact of the declining sugar economy.

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[4] *Ibid.*, p. 62.

By the end of the 18th century, the Brazilian economy as a whole was organized around five centers of activity. To the north, in Maranhão, a rather prosperous forest-extractive industry had been set up by the Jesuits, manned by Indian laborers. Sugar continued to dominate economic life in the Zona da Mata. Still within the sphere of sugar influence, but developing independence, were the Northeast cattle producers of the Sertão. Gold and diamond mining were concentrated in the Minas Gerais area. Far to the south, another area of cattle production was developing rapidly in what is now the state of Rio Grande do Sul. The latter area was the chief source of mules for the mining activities. Most of the Brazilian population lived in the Northeast, but in 1762 the capital of the country was moved from Salvador to Rio de Janeiro. The move clearly signaled the end of the Northeast's political and economic hegemony over the rest of Brazil.

The American and French revolutions and the Napoleonic Wars indirectly led to a brief revival of sugar prosperity in the Northeast during the first part of the 19th century. The reestablishment of peace, and later the introduction of sugar beets in Europe and the expansion of cane production in the United States, cut short the precarious up-swing of the Northeast's sugar economy.

Toward the second half of the 19th century, world cotton prices provided the stimulus for the commercial production of *mocó* tree cotton in the Sertão. A sizeable textile industry emerged during the 1840s. The American Civil War and subsequent collapse of world supplies added impetus to cotton and textile production in the region. Before the end of the century, however, the Northeast had lost considerable ground in both the raw material and semi-finished product markets internationally. Coffee production was developing rapidly in southern Brazil, drawing population and capital once more out of the Northeast and leading to a sizeable influx of European immigrants to the São Paulo region. By 1872, Brazil's population was about evenly split between North and South. Thereafter, the Northeast's proportion declined steadily.

During the first half of the present century, articulation between Brazil's economic centers increased, but integration lagged far behind. The burgeoning of coffee production in the Center-South was accompanied by the rapid expansion of southern consumer markets. When the Depression disrupted international coffee trade, the Center-South had already laid the bases for subsequent industrial growth; diversification of agricultural and mineral output accelerated. The formation of social overhead capital and full-

blown development of import substitution industries followed. The effects on the Northeast of growth in the Center-South were primarily centripetal.

For most of the first half of the 20th century the Center-South market was more important to Northeast sugar producers than were their world outlets. The industry was once more revived, and output expanded; generally buoyant international prices further stimulated the expansion. The long-term consequences of the return to relative prosperity were probably unfavorable on balance, however, to the regional economy. Occupation of the region's best agricultural resources by the sugar "mono-culture" was reinforced; production of foodstuffs was relegated primarily to the remaining limited areas outside the Drought Polygon, in particular, the Agreste. Even in the latter sub-region, the expansion of food production confronted a land tenure and use system better adapted for extensive cattle raising and subsistence farming. Industrialization was predicated on the lowering of food prices in urban markets, a proposition largely precluded by the inelasticity of the region's food supply. Indeed, the Northeast's sales of sugar and other non-food agricultural products to the Center-South were offset partially by food imports from the latter region.

Furthermore, Northeast sugar producers began to encounter heavier competitive pressures as production of sugar in the Center-South began to increase. To maintain their market position, the Northeast producers in turn brought downward pressure to bear on wages in the industry. Their immediate objective was not very difficult to accomplish, in view of the extreme inelasticity of the rural labor supply at the subsistence wage level. With wages extremely low, however, the effective size of the regional market for industrial and consumer goods remained severely limited, thus encumbering the industrialization process.

The relative lag in Northeast growth behind the Center-South was worsened by a flow of low-cost labor from the former to the latter region. Wages in the São Paulo area tended to increase less rapidly than labor productivity, thus accelerating returns to capital. A natural consequence was a flow of capital from the Northeast to the Center-South.

There also appeared to be a steady worsening in terms of trade between the two regions, particularly at mid-century. Throughout the 1947-1960 period, the Northeast earned substantial foreign trade

surpluses, with the exception of one year.[5] The relative backwardness of the region's industrial growth implied proportionately greater demand for the more highly taxed imports. National trade policy favored the importation of capital goods, and thus a large portion of the region's export earnings were transferred southward--perhaps 40% of its earnings in the above period.[6]

On the other side of the coin, the Northeast was forced to do its buying from the "infant," high-cost industries of the Center-South. Typically, the Northeast purchased high value-added goods from the Center-South and sold low value-added commodities, or raw materials, to the Center-South. Moreover, fiscal resource transfers at the federal level tended, on balance, to favor the Northeast. Thus, in relation to the Center-South, the Northeast accumulated chronic financial deficits.

In addition, Northeast importers typically paid higher rates for foreign exchange, compared to the rates paid by Center-South importers of "preferred" capital goods. Proceeds from Northeast exchange purchases were used to some extent in support of the coffee economy, and also to increase the lending capacity of the Bank of Brazil, which does most of its business in the Center-South.

Transfers to the Northeast through the federal fiscal mechanism were probably substantially in excess of direct tax revenues supplied by the region throughout the first half of the century. As will be explained, however, these transfers were primarily for emergency drought relief and a variety of public works intended to mitigate the effects of droughts. The contribution of the transfers to the growth of productive capital in the region was probably modest.

The Northeast can thus claim to have contributed importantly to the industrial development of the Center-South. The claim is justified to a large extent merely on the basis of the region's foreign trade performance in the decade and a half following World War II. The period coincided generally with the expansion of import substitution industries in the Center-South, which necessarily implied a substantial increase in capital goods imports. Northeast surplus earnings frequently covered the deficits incurred by the rest of the country during the period.[7]

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[5] Werner Baer, *Industrialization and Economic Development in Brazil* (Homewood, Illinois: Richard D. Irwin, Inc., 1965), p. 178.

[6] *Ibid.*, p. 175.

[7] *Ibid.* p. 174.

Despite the nature of the regional interaction during the first half of this century, it is probably inaccurate to say that the relative retardation of the Northeast was a necessary condition for development in the Center-South, or that the centripetal effects of the latter region's growth process were primarily at fault in the widening gap between the two. The process of economic decline in the Northeast has been traced back to the late 17th century. Temporary and partial recoveries occurred at intervals in the 2-1/2 centuries which ensued, but the basic structure of the region's economy remained unchanged. The most serious consequence of the brief recoveries may in fact have been to delay the day of reckoning with the structural changes needed to provide for sustained, long-term regional development. The poor resource endowment of the Northeast compared to the Center-South was also a natural point of divergence for the inter-regional growth disparities.

By mid-20th century, when national income accounting statistics first became available, the extent of the divergence in growth between the regions was evidenced. In 1920, São Paulo employed 29% of the nation's industrial workers, the Northeast 27%. By 1950, the percentages were 39 and 17, respectively. São Paulo's share of total industrial output increased from 39.6 to 45.3% from 1948 to 1955. In the same period, the Northeast's share fell from 16.3 to 9.6%[8] The gap was large and clearly widening. Efforts to close the gap were shortly to achieve high priority in national development policy.

Regional Development: Policies and Programs[9]

The preceding description of the historical evolution of the Northeast economy does not imply that until the 1950s Brazil was unaware of or indifferent to the problems of the region, nor that there existed a policy of decelerating the region's development for the benefit of the rest of the country.

To begin with, it may plausibly be argued that inter-regional differences in levels of growth were relatively insignificant at

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[8] Celso Furtado, *The Economic Growth of Brazil*, pp. 264-65.

[9] The description of Brazil's efforts to deal with the development problems of the Northeast is taken mainly from Albert O. Hirschman's case study, "Brazil's Northeast," in his book *Journeys Toward Progress*.

the beginning of this century. In addition, the deep gap documented by the national accounts fifty years later was a relative disparity in growth rates. The Northeast had not failed entirely to grow, but it had not kept pace with one of the truly outstanding development performances in Latin America. Perhaps it is more important to note, however, that Brazil began a genuine effort to deal with the perceived problems of the Northeast even before the last century had ended.

The long, cruel drought of 1877-79 and the enormity of the human suffering which ensued, propelled the Northeast into the national consciousness as a problem area. As has already been pointed out, the Sertão is subject annually to dry spells of varying intensity. Two factors accounted for the epic proportions of the 1877-79 drought: first, the extreme adversity and persistence of the combination of weather elements which "normally" gives rise to the semi-aridity of the sub-region; second, the population of the Sertão had increased significantly in the preceding twenty years of relatively good (drought-free) weather. In short, a large body of people were for the first time affected. Their presence in the Sertão when the drought hit is primarily attributable to the displacement of labor from the declining sugar industry to the jobs being created in the expansion of cotton production on the hinterland plateau.

The government responded to the crisis by creating a Royal Commission to investigate the causes and provide relief for the consequences. The Commission was, however, relatively ineffective in executing its mandate, and rather quickly retired into obscurity.

In 1902, the publication by Euclides da Cunha of his classic novel, *Os Sertões*, re-stimulated the national conscience to the plight of the drought *flagelados*. In 1909, the Inspetoria of Works Against the Droughts was created at the federal level to deal with the phenomenon. By law, the Inspetoria was to be run by engineers and natural scientists. The approach they adopted centered on the so-called *"acude"* solution. They proposed the widespread installation of water retention structures, theoretically for the purposes of providing water for human and livestock consumption during dry periods and facilitating food production in the area throughout the year. Their plans advanced only slightly, however, prior to the recurrence of severe drought in 1919.

Significantly, the drought of 1919 coincided with the beginning of the term in office of the only Northeasterner to govern

Brazil, Epitácio Pessoa. The new president set as an objective of his administration the "extinction" of the drought in the Northeast. He followed through with a vengeance.

From 1916 to 1919, the expenditures of the Inspetoria averaged about 4 million *milreis* annually. In the period 1921-1922, they jumped to an average of 142 million, a phenomenal 15% of total national revenues. From 1919 to 1923, the Inspetoria expended the approximate equivalent of US$150 million in current purchasing power![10]

The startling rise in expenditures was made possible in part due to a "shelf" of projects developed by the Inspetoria since its creation. It should also be noted that the construction works envisioned were contracted primarily to foreign firms. Exclusive of contractors' fees, about half of the total expenditures of the Inspetoria were payments for imported equipment.

President Epitácio left office in 1923. His successor, a native of Minas Gerais, eliminated the allocation of 2% of federal revenues to the Inspetoria (which had been made mandatory in the preceding administration). All works of the Inspetoria, many of which had not reached completion, were abruptly suspended in 1925. By that time, expenditures of the Inspetoria had fallen to 0.5% of federal revenues. The cutback in spending was part of a general policy of fiscal retrenchment. The lesson, as pointed out by Hirschman, is that a relatively stagnant region is likely to be the stepchild of a dynamic region. Spending on the poor region can tend to be regarded as a luxury, generally ill afforded.

The ascendancy of the Vargas regime in 1930 evoked a recommitment to the ideas of Epitácio Pessoa, triggered by the return of a drought lasting from 1930 to 1932. The extension of help to the suffering Northeast also coincided with the social reform objectives of the Vargas government. Inspetoria expenditures swung upward again, peaking at 10% of federal revenues in 1932. Several major dams were completed. Total storage capacity was quadrupled in the 1930s to a level of about 2.5 million cubic meters. Road construction advanced significantly. The morale of the Inspetoria was buoyant. For a short period at least (1934-37), a mandatory allocation of 4% of federal revenues to the Inspetoria was reinstated.

The 1940s were drought-free, making life relatively uneventful for the Inspetoria--except that 4% of federal revenues were

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[10] Albert O. Hirschman, *Journeys Toward Progress* (New York: The Twentieth Century Fund, 1963), p. 30.

again mandatorily assigned to it under the 1946 Constitution, and its name was changed to the National Department of Works Against the Drought, DNOCS.

The forties were eventful in other ways, however. At their outset, the wisdom of the Inspetoria approach was incisively criticized from within the ranks of the agency. The first director of the agency's agricultural research and extension service, Jose Augusto Trinidade, spoke out forcefully against the proliferation of dams without adequate provisions being made to ensure the use of the stored water for the production of food crops. He accurately noted that the dams benefited primarily the large landowner, who typically owned both the dam site and the irrigable lands below, but who by profession and outlook had no interest in irrigation. Water relieved the impact of drought on the livestock of the region, but water plus irrigation was needed to produce the food crops required for the security of the local human population. In good years, dam construction without irrigation might even yield a surplus of foodstuffs to alleviate supply problems in the major urban centers. Such construction also served to retain cheap labor in the area, which again benefited chiefly the large landowner, but increased the number of people likely to be hardest hit by drought.

Trinidade's arguments were convincing, and have been often repeated since, but to little avail. As of 1961, only 7000 hectares adjoining the dams built with public funds were under irrigation. The Orós Dam alone, largest in the region, was the potential key to the irrigation of 100,000 hectares in the Jaguaribe Valley.[11] The problems to be confronted in adjusting property rights to facilitate irrigation have become steadily more complex.

The other event worthy of note was the shift in emphasis which occurred in the 1940s from the problems of the Drought Polygon center region to the São Francisco River Valley.

The São Francisco is the larger of the two perennial streams which traverse the Northeast Region, and is navigable over large portions. It does not flow through the heartland of the Drought Polygon. Its adjacent soils are comparatively poorer, and receive less rainfall. In general, however, the river basin is less subject to the more severe effects of drought.

The creation of the São Francisco River Valley Commission, CVSF, at the federal level in 1948 not only represented a shift in

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[11] *Ibid.*, p. 69.

geographical focus, it marked the beginning of a new approach to the problems of the Northeast. The Commission was guaranteed 1% of federal revenues, in keeping with the precedent established (at intervals) by the Inspetoria. Similarly, the Commission was headquartered in Rio. The difference resided in the Commission's broad mandate to transform a total economic environment rather than to deal with a single specific feature of the environment. The approach owed much to the TVA pattern. Unfortunately, the indefinite nature of the Commission's task led to dispersion of effort. Its resources were spread widely, but thinly.

In 1948 a federally owned "mixed" company was formed to exploit the hydro-electric potential of the Paulo Afonso Falls located approximately at the mid-point of the São Francisco. Unlike the Commission, the São Francisco Hydro-electric Company, CHESF, was not endowed with a guaranteed portion of the federal revenues. Moreover, its purpose was singular and well-defined--the production and distribution of power. It has succeeded admirably. Almost on schedule, the first three 60,000-kilowatt generators went into operation in 1955, and lighted the cities of Salvador and Recife, each about 400 kilometers distant. CHESF also generated the prospect of power grid adequate for regional industrialization.

In 1951 drought struck again. The government's initial response was limited to the traditional "hydraulic" solution. The search began, however, for a fresh conceptualization of the region's ills. The first publication of national income estimates in 1951 and 1952 provided an appropriate framework. Henceforth, diagnosis of the "Northeast Problem" had as a starting point the widening inter-regional gap. The problem was to narrow the divergence.

Hirschman has cited three primary consequences in terms of regional development policy. First, income generation took priority over the fights against the drought. Second, the region laid claim to the continuous attention of the nation, in place of periodic and temporary emergency relief. Finally, the sugar zone of the Northeast was brought into the development discussion.

One concrete expression of the new thinking and loss of faith in past approaches was the creation in 1955 of the Bank of the Northeast. The Bank was assigned 0.8% of federal revenues. Its mandate initially was to extend medium- and long-term credit for agriculture, particularly with regard to the commercial xerophilous crops. Early in its existence, however, the Bank broadened

its objectives in the direction of general development banking. Unlike all other agencies previously created to deal with Northeast problems, the Bank was headquartered in the Northeast, at Fortaleza.

The Bank encountered considerable difficulty at the outset in accomplishing its broader objectives. It had no "shelf" of development investments to draw upon. After five years, short-term general commercial credit still accounted for 75% of outstanding loans. By 1962, however, specialized medium- and long-term loans occupied about half of the Bank's portfolio.[12]

Severe drought returned to the Northeast in 1958, and in its wake the bankruptcy of the Inspetoria's "hydraulic" solution stood out starkly. Although 6.4 billion cubic meters of storage capacity had by this time been created, the combined relief employment rolls of DNOCS and the Federal Highway Bureau numbered more than a half million people. The term "drought profiteering" entered the national vocabulary and disillusion was complete.[13]

In May 1958, President Kubitschek charged the head of the National Economic Development Bank, economist Celso Furtado, with the task of analyzing the economy of the Northeast and preparing a comprehensive proposal for federal action. Furtado reported back in early 1959:

> The Brazilian Northeast stands out in the Western Hemisphere as the most extended and populous zone where income per capita is below 100 dollars. The average income of the Northeasterner is less than one-third that of the inhabitant of the Center-South. Since income is far more concentrated in the Northeast, the disparity in living levels of the mass of the population is even greater.[14]

There was no doubt in his mind but that the disparity of income levels between the regions was the most serious problem facing the nation's development. He reviewed the national institutional biases which has reinforced the growth of the disparities, and he delineated the structural obstacles which would have to be overcome within the Northeast's economy in order for the region to sustain accelerated long-term development.

In particular, Furtado focused on the strong braking effect which high urban food prices exerted against industrialization.

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[12] *Ibid.*, p. 64.

[13] *Ibid.*, pp. 68-69.

[14] *Ibid.*, p. 74.

He attributed the high food price levels to a combination of inadequate, unstable and inelastic supply, and even in good crop years, to exceptionally high marketing costs. The level of food prices, in his view, deprived the Northeast of its most significant comparative advantage, cheap labor. Without this advantage, the Northeast would not be able to develop the new, potentially dynamic markets in the Center-South which were urgently needed to motivate its industrialization process.

His proposals for governmental action were direct and uncomplicated. Essentially, they were (1) to put the basins of the dams constructed with federal monies under irrigation so as to generate a food reserve in the Sertão; (2) to head off the advance of slash-and-burn agriculture in the virgin tropical rain forest of Maranhão and to colonize the territory on the basis of rational agricultural techniques; and (3) to reorganize land use in the Zona da Mata so as to bring portions of the region's best lands into production of food for regional markets. The common denominator of his proposals was more food at lower prices in the urban markets.

Each of the proposals raised delicate and fundamental issues. Irrigation of the federal dam basins would require revision of an entire land tenure system. Colonization of Maranhão suggested large-scale population movements across political boundaries. Reorganization of land use in the sugar zone would entail the basic transformation of an economy which had perpetuated itself without significant change for 4-1/2 centuries.

The Superintendency for the Development of the Northeast: SUDENE

The inevitable storm of controversy which followed the publication of Furtado's report was tangible proof of the sensitivity of the issues he had raised. The fact that his proposals were incorporated in the creation of SUDENE in December 1959 demonstrated that development policy in the Northeast had come of age. The stage was set for a direct attack on the root causes of the region's economic ills.

The legislation giving birth to SUDENE endowed the agency with powers commensurate with its tasks. It was given control over the policies, plans and investments of all federal agencies operating in the Northeast; their activities were henceforth to be coordinated with the over-all regional development planning of SUDENE.

The agency was to execute its plans through the existing structure of federal entities, in cooperation with state and local administrations, and, where necessary, directly under its own authority. The legislation also permitted SUDENE to recommend the creation, retirement or reform of federal agencies in the Northeast. Power to expropriate property in "the interests of social welfare" was given to the agency, as well as primary responsibility for public works and emergency relief in time of drought. SUDENE was authorized to provide federal income tax and customs duties relief, as well as preferential treatment in foreign exchange transactions to private firms in furtherance of regional industrialization. No less than 2% annually of federal revenues were to be provided to the agency, and such additional funds as Congress approved.

SUDENE's First Master Plan was submitted to Congress in mid-1960. It was essentially an elaboration of the proposals which Furtado, now the first Superintendent of SUDENE, had submitted to President Kubitschek early in 1959. The initial opponents of the proposals took advantage of the opportunity to launch a second attack. Tumultuous debate prevented Congress from approving the Plan until December 1961. Appropriation of the requested budgetary funds followed approval, and SUDENE was in operation.

In August 1961, Furtado met in Washington with President Kennedy and top U.S. AID officials. It was agreed that a special mission of U.S. experts would be dispatched promptly to the Northeast to study SUDENE's plans and assistance requirements. The Bohan Team arrived in Brazil in the fall of 1961 and reported back to President Kennedy in February 1962. In April, the United States signed with Brazil the Northeast Treaty pledging US$131 million for the first two years of a five year program of cooperation.

Flush with the preceding series of achievements, SUDENE moved quickly to initiate investments, but concentrated primarily on relatively non-controversial projects. Highway construction, water and power supply, and the promotion of industrial investment were the primary thrusts. In agriculture, the agency devoted most of its efforts to the colonization of Maranhão.

Nevertheless, the authors of the First Master Plan left no doubt about the priority attached to solution of the regional food supply problem. They wrote:

> One notes that the high proportion of expenditures on food in the social accounts of the Northeast--in the city due to shortages, in the countryside due to income stagnation--reduces the portion which would

be destined to another expenditure, including manufactured goods. The ultimate consequence is the restriction of the market for manufactured goods and the discouragement of industrial production.[15]

And furthermore:

> In the diagnosis of the Northeast economy, on the basis of which the government decided to create SUDENE, the same priority was given to these measures to increase agricultural output and facilitate its distribution as was attributed to the intensification of industrial investment, since "the industrialization of the Northeast has been seriously hindered by the inadequate supply of foods in the principal urban centers of the region." And the report, for greater emphasis, clearly affirms that "the solution of the supply problem of these centers constitutes a prerequisite of the success of any industrialization policy."[16]

Thus, the central problem of Northeast development was recognized as that of promoting the simultaneous, mutually reinforcing growth of both agriculture and industry. The problem was seen to hinge primarily on the relationship between urban food price levels and the size of markets for the products of the region's industry. It was also perceived that the food distribution and marketing systems played a key role in determining the real level of urban food prices. Finally, the writers of the First Plan emphasized that agricultural development was not only crucial to successful industrialization, but that the growth of industry would substantially enhance the performance of the agricultural sector.

With the publication in mid-1965 of the Third Master Plan, SUDENE was able to report signs of substantial improvement in the regional economy. Per capita income in the Northeast, as a percentage of per capita income for the country as a whole, had continued to decline through the mid-fifties. Thereafter, however, an upward trend was discernible. The region's relative position in terms of national per capita income had increased from a low of 44% (1953-56 average) to an average of 54% in the period 1960-62.

Improvements in statistical techniques may have tended to slightly over-estimate the upward trend. Moreover, regional

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[15] Brazil, *I Plano Director de Desenvolvimento Econômico e Social do Nordeste, 1961-1963* (Recife: Dir. de Documentasão da SUDENE, 1966), p. 118.

[16] *Ibid.*, p. 194.

population was growing more slowly than that of the rest of the country, and the rate of increase in per capita income for the rest of the country had decreased measurably in the early sixties. In the period 1960-62, regional per capita income increased at the rate of about 5% annually, and at less than 3% for the country as a whole.

The conclusion could still be tentatively entertained, however, that the inter-regional gap had ceased to widen and apparently had closed slightly.

Expansion was occurring most rapidly in the agricultural sector. The Third Plan reported that from 1955 to 1962 non-livestock output had increased by 43%; livestock production was up 22%; and the sector as a whole had expanded output at an average rate of 4.7% annually. Of particular importance was a notable change in the composition of agricultural production: food output had increased by 52% from 1955 to 1962, as compared to 37% expansion in non-food and export crops. Among foodstuffs, rice production had increased most, manioc production least. The SUDENE analysts were dismayed over the apparent lack of improvement in agricultural productivity: output expansion was nearly matched by the increase in cultivated land. Nevertheless, 48% of regional product was contributed by agriculture. The sector's growth was therefore a key factor in the over-all improvement of the region's economic performance.

The authors of the Third Plan singled out two major factors causing the unsatisfactory levels of investment and productivity improvement in the agricultural sector: agrarian structure and the marketing system. With respect to the latter, they noted that the stimulus which price increases should transmit to the producer were being intercepted and blocked by the marketing system. In the other direction, the deficiencies of the marketing system were also regarded by the SUDENE analysts as inhibiting the development of the over-all regional economy be reducing the volume and increasing the price of foodstuffs reaching the urban markets.

Indications of growth in the industrial sector were disappointing. At the time the Third Plan was prepared, 66% of the Northeast population continued to live in the rural sector, as compared to 55% for Brazil as a whole, and less than 50% in the Center-South. Urban population in the region grew rapidly during the fifties (4.8% annually), though more slowly than in any other region of Brazil. Industrial productivity in 1962 was up 54% compared to 1955. The number of firms with five or more employees had

increased 74% from 1958 to 1962, but the average number of employees in such firms had declined from 41 to 29, and employment in the aggregate had increased by only 22%. The apparently strong inclination toward labor-saving investments troubled the SUDENE analysts. They foresaw a worsening of the employment problem and a less than satisfactory distribution of income resulting from the labor-saving trend.

Food products continued to dominate the region's industrial structure, even though this industry's contribution to value product in the sector declined slightly from 33 to 30% in the period 1958-62. Its share of total value added was relatively constant at about 29%. The textile industry was a close second using both criteria, and continued to be pre-eminent in terms of employment, accounting for 37% and 31% of the industrial labor force in 1958 and 1962, respectively. The food industry's share in the labor force increased slightly over the same period from 25 to 29%.

The writers of the Third Plan could find no significant trends indicating a basic transformation of the region's industrial structure. Nevertheless, they were optimistic that such changes would begin to occur as investments in social infrastructure matured and the impact of the SUDENE private investment incentives program started to be felt.

Generally, favorable trends in terms of volume and value of exports were discernible for the five year period ending in 1962. These trends permitted the conclusion that the external sector contributed decisively to the reduction of disparities between the Northeast and the rest of the country. However, preliminary indications from 1963 on suggested the possibility of reversals in regard to several major exports of the region.

Despite the good reasons for optimism with regard to the future, based on observable improvements in the region's economic performance, the authors of the Third Plan were careful to point out the seriousness of the problems which remained, as well as several major potential sources of difficulty.

Per capita income in the Northeast was still less than half that of Latin America as a whole. Only Bolivia, Haiti and Paraguay were worse off, but the Northeast had twice the combined population of these countries. In addition, the intra-regional distribution of income revealed extreme inequities, both geographically and among social groups. Concern for the distribution of income among the region's population was, in fact, a dominant

characteristic of the Third Plan. SUDENE's concern in this regard was expressed as follows:

> In effect, the problem of income distribution is equivalent in magnitude to the problem of income growth, not only for reasons of social welfare, but equally because of the damage which accentuated unequal distribution of the receipts of the community can do to the expansion of the market, and as a consequence, to the expansion and diversification of the economic activities which are characteristic of the economic development process.[17]

The planners also foresaw an approaching end to the cultivable land available in the region for agricultural expansion. Most of what remained, especially in Maranhão, could be brought into cultivation only with sizeable investments in infrastructure. If the agricultural sector were to continue to play a dynamic role in the region's economy, improvements in productivity could no longer be delayed. The apparently worsening trends in the export sector, in addition to having a potentially serious impact on regional income, could also adversely affect the agricultural sector's progress.

In the industrial sector, job creation was not keeping pace with additions to the labor force resulting from natural population growth and migration to the cities. Unemployment, in short, was becoming an increasingly serious problem.

The investment program stipulated under the Third Master Plan was basically an extension of the programs begun under the previous two Plans. Two general shifts in emphasis were notable. Infrastructure investments were to be scaled down slightly in relation to all others. Human resource investments were to increase substantially, and to involve a much broader range of activities. The latter shift reflected one of the most prominent features of the Third Plan, in contrast to the preceding two: attention to the human resource not only as a factor of production, but also as the direct beneficiary of the development process. The substantial increase in programs planned for human resource development also constituted one approach to the income distribution problem.

With respect to agriculture, the Third Plan was intended to maintain SUDENE's original emphasis on the increase of food production. A major policy innovation was the high priority given in the

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[17] Brazil, *III Plano Director de Desenvolvimento Econômico e Social do Nordeste, 1966-1968* (Recife: Div. de Documentacão da SUDENE, 1966), p. 24.

Plan to improvements in the agricultural marketing system. Deficiencies in the marketing system were viewed by the SUDENE analysts as constituting a serious obstacle to regional industrialization. In the words of the Third Plan's authors:

> The deficiencies of the marketing and distribution system thus constitute a serious obstacle to agricultural development. . . and also prejudice the development of the economy as a whole, for it reduces the supply of food to the urban centers, even while food production is increasing.[18]

Two fundamental conclusions formed the basis of programming for SUDENE's investments in the agricultural sector under the Third Plan. First,

> . . .the process of Northeast industrialization may be frustrated if, in the short run, [agricultural] marketing is not improved and the supply of food and raw materials for regional industries is not substantially increased;

Second,

> . . .the increase in regional agricultural production verified in recent years was of a purely extensive character, and thus has resulted in appreciable increases in the costs of production, with direct consequences for the very process of development.[19]

The marketing program's share of allocation to agriculture was to increase from 15% under the Second Master Plan to 35% by the end of the Third Plan. Marketing improvements were expected to contribute significantly to a short- and medium-term increase in effective regional food supply.

In industry, the Third Plan called for continuation and acceleration of the investment incentives program then in its fourth year of operation. The results already achieved under the program were positive and significant. They indicated clearly that the program was the most effective single action undertaken by the government directly to stimulate regional industrial development. The Plan reaffirmed SUDENE's basic policy to exclude from the incentives program only those investments resulting in the production of "non-essential" goods, the installation of idle capacity, or the worsening of the balance of payments.

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[18] *Ibid.*, p. 33.

[19] *Ibid.*, p. 111.

Five over-all objectives were established for the Third Plan. They are:

1. To increase gross regional product by 7% annually (which implies a 4.7% annual increase in regional per capita income);

2. To increase the internal spatial and inter-sectoral integration of the regional economy, and to accelerate the integration of the regional economy with the national economy in general;

3. To create new job opportunities, particularly in the industrial and services sectors, so as to diminish the unemployment problem;

4. To accelerate the expansion of output in agriculture and mining, in order to increase per capita food supply and expand the capacity of the rural population to consume manufactured products; and

5. To broaden direct access to the benefits of development, thus facilitating greater individual achievement and social mobility.

A very brief description of the SUDENE investment incentives program--how it operates, the response of the private sector to it, and its effects on regional economic growth--will round out this section of the chapter.

The basic program was established in 1961 in the legislation accompanying Congressional approval of SUDENE's First Master Plan. It was subsequently revised under the legislation of the Second Plan in 1963. The relevant provisions of the two pieces of legislation are, respectively, Articles 34 and 18; hence, the program is generally referred to as the "Articles 34/18" program.

Originally, the program allowed corporate entities in Brazil to deposit up to 50% of their federal income tax liabilities in the Bank of the Northeast for subsequent investment in the region's industrial sector. The amount of the tax deposit had to be matched by an equal amount of private funds in the final investment project. The depositor could undertake an investment of his own, or invest in the project of another corporate entity, in which case the latter was responsible for the matching funds. SUDENE approval was required for all investment projects.

Since 1966, the matching funds requirement may be set at 25, 50 or 75% of the total investment, depending on the merit of the project as determined by SUDENE. The Bank of the Northeast will supply up to 50% of the matching funds required, in the form of a loan at very favorable interest rates. Theoretically, therefore, an investor in a maximum priority project could draw on 34/18 funds

(his own or those of other corporate depositors) for up to 75% of the total investment; he could borrow up to 12-1/2% of the project cost from the Bank of the Northeast, and would thus have to provide a minimum of only 12-1/2% of the project cost in matching funds.

The program was extended in 1965 to the agricultural and telecommunications sectors. In addition to fixed capital investment funds, limited working capital financing for Northeastern firms is now also available under the program.

In 1962, the first full year of the program, almost 2,000 corporate tax payers made deposits. By the end of 1966, the number of depositors had increased tenfold, to include approximately 10% of all eligible firms in Brazil. São Paulo firms accounted for more than half the number of deposits. Over the same period, the number of cruzeiros deposited annually increased from 6 million to 252 million new cruzeiros.

Deposits have accumulated much faster than projects have been approved and disbursements made. Of total deposits in 1966, for example, 60% had been allocated and only 15% disbursed to approved projects as of mid-1967. The lag from deposit to investment has itself, however, been instrumental in facilitating regional growth by enabling the Bank of the Northeast to expand its short-term commercial lending operations. Over the past four years, the Northeast borrower was thus spared the full impact of the federal government's tight credit policy. As Hirschman has pointed out, the deposit-to-investment lag is to some extent unavoidable, given the complexity of preparing new projects. It also helps drive the system forward by stimulating the search for investment opportunities (unutilized funds revert to the Federal Treasury three years after deposit).

As for the effect of the program on regional growth, Hirschman has estimated that 34/18-induced investments through mid-1967 will account for a doubling of the industrial capital stock existent in the region just prior to the initiation of the program.[20]

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[20] Albert O. Hirschman, "Industrial Development in the Northeast and the Tax Credit Mechanism of Article 34/18," a preliminary draft report prepared under contract AID-12-544 for the United States Agency for International Development (July, 1967), p. 16.

Equally important will be the impact of the program on the structure of industry in the Northeast. In Hirschman's words:

> The projects subsidized by the 34/18 mechanism, in short, are bringing a more diversified and sophisticated industrial structure to the Northeast, with sharply increased representation of industries that are both dynamic and linkage-rich.[21]

In addition:

> The 34/18 projects approved up to June 1967 will give rise to 67,800 new jobs. This figure compares to a total industrial work force of 176,800 in 1959.[22]

Although the nature of investments taking place under the program are relatively capital intensive, the industries which should appear to service the 34/18 industries will probably be comparatively labor intensive and thus will tend to alleviate the unemployment problem.

The 34/18 program is just beginning to build up momentum. Its full impact on Northeast development will not come into operation for several years. It clearly stands out, however, as the most dramatic and consequential growth process to be initiated in the Northeast since the great sugar boom of the early Colonial Period.

The 34/18 program will be discussed in somewhat more detail in the next and subsequent chapter. Here, however, an advance indication should be given of two major problems confronting the program. First, it seems likely that the creation of output capacity under the program is proceeding at a rate which exceeds the growth of effective demand for the products of the new industries. If this trend becomes exaggerated, the new industries may be forced to operate at low levels of capacity utilization, and thus at high unit cost levels. Market sizes would be even further restricted as a result.

The problem boils down to the consumers' discretionary income being inadequate to sustain the rapid expansion of output capacity; consumers' real income, in turn, is largely a function of the relative price of food. In other words, Furtado's original analysis of the relationship between food supply and regional industrialization

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[21] *Ibid.*, p. 19.

[22] *Ibid.*, p. 21.

is still valid and of critical relevance to the formulation of Northeast development policy.

Second, the 34/18 program has been restricted primarily to the financing of investment and operating costs of firms engaged in production. Marketing and distribution activities have been largely excluded form 34/18 financing. It is our contention that the latter activities can be of direct and vital importance in determining the economic success of investments in productive capacity. Of particular importance in this regard would be the distribution and marketing of (1) agricultural inputs, such as fertilizers and farm equipment; and (2) agricultural outputs, both raw materials for industry and commodities for human consumption. Improvements in the efficiency of the marketing systems for such goods could lead to the lowering of production costs, the expansion of output, and the increase of effective supply of agricultural products, and thus, ultimately, to the enlargement of markets for the products of the region's industry.

Government Marketing Agencies

A large number and a wide variety of government agencies are directly and indirectly involved in the marketing systems of the Northeast. In some instances the agencies are organized to deal with single commodities; for example, the Sugar and Alcohol Institute and the Coffee Institute. Other agencies perform a single marketing function across many different commodity channels. For example, CIBRAZEM, the Brazilian Warehousing Company, deals specifically with storage; SIMAN is the Northeast Agricultural Market Information Service. CANESA, the Northeast Supply Company, and SUNAB, the National Supply Superintendency, are organized to deal generally with problems in the marketing sector, the former on a regional basis, the latter nationally. The Production Financing Commission, CFP, provides minimum price support in the agricultural sector; credit and investment capital are supplied to the sector from many public sources. The Brazilian Food Commission administers the equivalent of the U.S. Pure Food and Drug Act. Another system of government agencies exists to regulate competitive behavior and the use of economic power in the private sector of the Brazilian economy, much like the U.S. Federal Trade Commission and Justice Department.

The preceding list is illustrative, not exhaustive. It does not include, for example, any of the state and local agencies which

affect marketing operations. A separate treatise would be required to fully describe the host of government mixed-economy and other semi-public entities which influence or engage in describing the roles of the two agencies most prominent in Northeast marketing, SUDENE and SUNAB, and the basic approaches of these agencies to the problems of marketing.

As is evident throughout the remainder of this report, analysis of marketing system dynamics is employed essentially as a tool for investigating the over-all process of economic development. The marketing systems studied by the SUDENE/MSU team are not limited to the agricultural sector of the regional economy, but extend to the distribution of industrial products, the exchange processes between sectors, and the flows of general import and export commodities. The marketing systems are used as convenient mechanisms primarily for studying the transfers of goods and the corresponding transfers of income within the Northeast community and between it and other communities. In this general sense, most of the programs in which SUDENE is engaged can be viewed as activities which influence the processes of marketing. In practice, however, SUDENE has adopted a more limited, conventional view of its role in marketing, specifically restricting its attention to the agricultural sector.

Thus, within SUDENE's Department of Agriculture and Supply is the Division of Supply, which has the general responsibility for planning, organizing and instituting SUDENE's programs in the area of agricultural marketing. The Supply Division has, in the past, been chiefly concerned with the collection of marketing statistics, the administration (in cooperation with the national Production Financing Commission, CFP) of minimum price support programs for Northeast producers, and the improvement of the region's storage facilities for agricultural commodities. Other activities of the Agriculture and Supply Department which are conceptually related to marketing have included the distribution of modern agricultural inputs to producers and the organization of producer cooperatives for the purchase of farm inputs and the sale of agricultural products. A major responsibility of the Supply Division has also been to provide basic policy and planning guidance to CANESA, the Northeast Supply Centers, Inc., a subsidiary, "mixed-economy" company of SUDENE.

CANESA can be regarded as SUDENE's principal vehicle for operations in the agricultural marketing sector. Ultimately, the CANESA system is to consist basically of a network of central

wholesaling establishments in the major cities of the region, initially in Recife, Fortaleza and Salvador. The central wholesale markets will also function as collection and distribution points for price, supply, demand and quality information linking rural and urban channel operators; they are also to serve to coordinate the use of transportation and storage facilities and to promote the adoption of grading systems. Producer cooperatives are to be given special treatment under the CANESA plan in an attempt to foster this particular form of rural organization.

To date, CANESA has been severely constrained financially. Construction of the Recife wholesale center, CARE, is approximately 25% completed and the center is in partial operation. The centers for Fortaleza and Salvador are still in the planning stage.

SUNAB, the National Supply Superintendency, was created in 1962. Until recently it was a "semi-autonomous" agency of the federal executive, but now is subordinate to the Ministry of Agriculture. Law No. 5, which established SUNAB, endowed the agency with comprehensive powers to regulate and perform activities in the marketing sector. Its general authority includes:

1. preparation and execution of a national plan for the supply of essential products;
2. maintenance of a national system of storage and refrigeration facilities;
3. establishment of import and export quotas for essential products;
4. "intervention" in the private sector to ensure the unhindered distribution of essential goods and services;
5. maintenance of stocks for the purpose of supply and price regulation;
6. establishment of information systems regarding production, distribution and consumption, with the right to requisition data from whatever source necessary;
7. regulation of transport and distribution services;
8. establishment of norms and execution of measures designed to regulate and improve marketing conditions;
9. establishment and regulation of prices;
10. examination of the stocks and written records of any marketing firm;

11. performance of all other acts necessary in carrying out its responsibilities.[23]

Although the preceding list amply illustrates the breadth of SUNAB's powers, the agency has primarily concerned itself with the selective regulation of prices at the retail and wholesale levels. Also, through COBAL, a subsidiary "mixed-economy" company, SUNAB has attempted to maintain adequate supplies of staple commodities in major urban centers; through CIBRAZEM, another such company, it has maintained a network of storage and refrigeration facilities; through the CFP, SUNAB has instituted a program of minimum price supports for selected agricultural commodities at the level of producers. As previously noted, the CFP price support program in the Northeast is operated in conjunction with SUDENE.

There are differences and similarities in the ways SUDENE and SUNAB have approached the problems of marketing. Despite the broad mandate of each agency, they have both restricted their attention to marketing in the agricultural sector, that is, to the exchange process leading from the farmer to the final consumer.

This conceptualization of the scope of marketing has the basic limitation of failing to account for the vital exchange linkages between the agricultural and other sectors of the economy. The supply of modern farm inputs, such as fertilizers, insecticides and machinery, is left out of the picture. Similarly absent is the supply of non-food consumption goods from the urban to the rural areas. At the urban market level, this narrow view of the marketing process does not provide the basis for analysis of the relationship between real food prices and market sizes for manufactured consumer goods. In short, the exchange processes from farmer to consumer do not constitute a closed system, and cannot be adequately analyzed as such.

Looking at marketing as the movement of goods from the farmer to the consumer has the second major disadvantage of failing to recognize the highly important effects which the modern urban marketing enterprise can have on the coordination of the supply channel back to the level of the producer. Supermarkets and certain forms of efficient wholesale establishments have been described as guaranteed market outlets looking for stable sources of supply.

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[23] Brazil, *Superintendencia Nacional do Abastecimento, Antecedentes, Organização, Legislacão Correlata*, Documento No. I da SUNAB (Rio de Janeiro: SUNAB, 1963), pp. 21-22.

Because of their imperative need for dependable, high volume, consistent quality supply, these types of firms have in many countries effected major improvements in the efficiency with which goods reach urban centers, and the condition and quality of goods entering the urban marketplace. Moreover, such firms can affect relative food prices at the level of the consumer even without becoming heavily involved in "backward vertical coordination" activities, as will be demonstrated in subsequent chapters.

For a variety of reasons, both SUDENE and SUNAB have, in effect, adopted a "static" view of the urban distribution sector. The fact, for example, that SUDENE's 34/18 funds are not available to urban food marketing enterprises (and that such firms generally can acquire only very short-term credit from public lending institutions) suggests that perhaps not enough consideration has been given to the real urban consumer income which might be generated by fostering enlargements in scale and improvements in efficiency of urban distribution firms.

SUNAB, on the other hand, has concentrated its efforts on the selective control of prices at the retail and wholesale levels. Anti-inflationary policy and political considerations have been the principal factors behind SUNAB's price control efforts. Implicit, however, in the attempt to control prices is the assumption that the firms whose prices are being controlled are in a monopolistic or similar position to consistently exploit, or indeed to engender, the generally inflationary trends of the economy. The evidence presented in subsequent chapters does not support such an assumption. What it does indicate is that firms which have been able to increase the scale and efficiency of their operations have maintained consistently lower prices than have firms without similar management "know-how" or access to investment capital.

Government control of prices is obviously a short-run expedient at best. For food prices to decline in relative terms, greater efficiency and improved cocrdination of the marketing system should be fostered, and many such gains can be achieved at the urban distribution level.

Both SUDENE and SUNAB (through the CFP) are to be praised for their efforts to establish a minimum price support program for Northeast producers. Here again, however, the full complexity of the marketing system should be carefully considered. The support price necessary to generate a positive supply response on the

part of the producer should be coordinated with the level of prices which are controlled at the wholesale and retail stage. The spread between supported producer and controlled consumer prices obviously will determine the economic viability of intermediate channel operators. The more fundamental question, however, is whether price controls at the wholesale and retail levels are preferable to direct promotion (including the provision of government financing) of more efficient wholesale and retail operations.

Despite these general shortcomings in the approaches of SUDENE and SUNAB to the problems of marketing, both agencies have contributed substantially to improvements in the sector. Their joint efforts to establish minimum price supports have already been mentioned. Both agencies have been able to make progress in improving the physical infrastructure of agricultural marketing in the region. SUDENE, in cooperation with the Ministry of Agriculture and other agencies, is instituting a new market information system, SIMAN. SUDENE is also engaged in sizeable research and experimentation efforts, has made 34/18 funds available to agriculture, and is fostering the development of producer cooperatives. CANESA is moving to expand and improve urban wholesale markets, even though its progress has been slowed due to lack of funds. Through COBAL, SUNAB has been able to avert several major food shortages in principal cities of the Northeast, and has unquestionably had some success in slowing the inflation of food prices at the consumer level.

CHAPTER 3

INDUSTRIALIZATION IN THE NORTHEAST

The Region's Industrial Sector

When placed on a national scale, the Northeast's industrial establishment clearly carries little weight. Although almost a third of Brazil's population resides in the Northeast, the Center-South produces approximately 90% of the nation's industrial output and employs about 80% of the total industrial labor force.[1] Industry provides only 17% of the Northeast's regional value product, while it provides 30% of the national value product.[2] The structure of Northeast industry in the early 1960's contrasted markedly with that of the nation (Table 3.1). As seen in the table, value added in capital and intermediate goods was a small percent of total industrial product for the Northeast as compared to all of Brazil.

Table 3.1 shows that Northeast industry is heavily concentrated in agricultural product processing and light consumer industries. Food processing is most important in terms of output and value added. Textiles run a close second and provide the largest single source (about 30%) of industrial employment.[3] In 1962, these two industries together accounted for almost 60% of employment, 55% of wages paid, 61% of product value, and 56% of value added by the region's industrial sector.[4]

Industrial Growth and Transformation

The beginnings of recent industrial modernization and expansion in the Northeast can be traced to the late fifties and early sixties. A key factor in the initiation of industrial change was the availability of hydroelectric power from the Paulo Afonso site

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[1] Brazil, Brazilian Embassy, *Survey of the Brazilian Economy*, 1966, (Washington, 1967), p. 29.

[2] *Ibid.*, p. 115.

[3] SUDENE, *III Plano Director de Desenvolvimento Econômico e Social do Nordeste, 1966-1968*, (Recife, 1966), p. 42.

[4] *Ibid.*

Table 3.1 Structure of Industrial Production in the Northeast

	% of Total Value Added (1962)		Investment Represented by Approved 34/18 Projects[a]
	Brazil	Northeast	
1. CAPITAL & INTERMEDIATE GOODS	58.8	29.2	67.4
Non-ferrous Metals	5.0	6.3	9.4
Metallurgy	12.4	2.7	8.7
Comm. & Electric Material	5.6	0.1	3.3
Transport Material	10.2	0.4	6.7
Mechanical Industry	3.2	0.2	2.3
Lumber	2.5	1.0	1.6
Paper & Cardboard	2.9	0.9	0.5
Rubber	2.0	0.9	0.5
Leather & Furs, etc.	1.0	1.2	0.1
Chemical & Pharmaceutical	14.0	15.5	34.3
2. CONSUMPTION GOODS	41.2	70.8	32.7
Furniture	2.0	1.5	0.4
Textile	13.8	26.8	18.2
Clothing, Shoes, Handicraft	3.4	1.7	1.4
Food Products	13.2	30.4	7.9
Drinks	2.6	3.9	3.9
Tobacco	1.9	4.3	---
Printing	2.5	1.9	0.4
Miscellaneous	1.8	0.4	0.5
TOTAL	100.0	100.0	100.0

[a]Approved from 1963 through mid-1967.

SOURCE: SUDENE and BNB/ETENE: presented in Albert O. Hirschman, "Industrial Development in the Brazilian Northeast and the Tax Credit Mechanism of Article 34/18," a preliminary draft report prepared under Contract AID-12-544 for the United States Agency for International Development, July 1967.

and other sources. From 1956 to 1959, total regional power generation more than doubled and by 1964 more than redoubled.[5] Development lending by the Bank of the Northeast also gained momentum and contributed to the growth of industry.

With the exception of two drought years, food processing increased steadily, output expanding almost 40% from 1956 to 1964.[6] Textile production, beset by acute obsolescence, increasing competition from the Center-South, and the drought, fluctuated erratically. Only in 1962 did textile production exceed the 1956 output level.[7]

Substantial increases in production were registered in mining and chemicals, indicating the beginnings of structural change in the secondary sector, but both industries continued to play a minor role in total regional industrial output.

SUDENE's Articles 34/18 Program

SUDENE's program of industrial investment incentives came into effect in 1963. At about the same time, public investments in roads, power and other infrastructure were increased significantly by SUDENE and other federal and state development agencies. The private sector responded quickly to these initiatives. Investment in industry accelerated dramatically. Albert O. Hirschman predicted that actual and approved investments under SUDENE's incentive program through mid-1967 would probably result in the doubling of Northeast capital stock over the 1964 level.[8]

About 75% of investment funds under the SUDENE program have been coming from the states of São Paulo and Guanabara.[9] Thus, a large portion of the plants built, expanded and modernized under the program are subsidiaries of Center-South enterprises. In general, this has resulted in the transfer to the region of more up-

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[5] *Survey of the Brazilian Economy, 1966, op.cit.*, p. 26.

[6] *Ibid.*

[7] *Ibid.*

[8] Albert O. Hirschman, "Industrial Development in the Brazilian Northeast and the Tax Credit Mechanism of Article 34/18," a preliminary draft report prepared under contract AID-12-544 for The United States Agency for International Development (July 1967), p. 16.

[9] *Ibid.*, p. 9.

to-date managerial practices and production techniques, in addition to the fresh capital. The recent development of a "new industrial mentality" in the Northeast owes a great deal to this transfer mechanism.

Moreover, Hirschman pointed out, an important change in the structure of Northeast industry was occurring as a result of the SUDENE investment incentives program. Comparing the 1962 regional industrial structure with the structure of the SUDENE program investments (Table 3.1), Hirschman noted a nearly exact reversal of proportions between consumption goods industries and capital and intermediate goods industries.[10] In other words, the new investments were closely approximating the more sophisticated structure of industry elsewhere in Brazil. The prospect was thus raised of a significantly more dynamic and linkage-rich industrial sector for the Northeast.[11]

Comparisons of Northeast and Center-South Industrialization

The changes described in the region's industry broadly parallel the preceding import-substitution phase of industrialization in the Center-South. From industry dependent heavily on agricultural raw materials, the Northeast is apparently moving toward the production of substitutes for previous imports from the Center-South.

Several differences in the process are notable, however. First, the resource base of the Northeast is severely limited for the purposes of certain heavy industrial groups, the most prominent of which is steel. The nature of the region's primary resources will thus determine the extent to which import substitution will proceed in some sectors. Assembly plant operations in industries relying heavily on steel inputs will likely persist. In such industries the initial benefits of an investment inflow from the Center-South will be partially attenuated by relatively thin layers of value added within the region and by continuing

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[10] *Ibid.*, p. 19.

[11] In Chapter 1, the concept of "transaction-productivity" was defined for use in this report. Hirschman's "linkages," as explained there, can be used as a substitute term for "transaction-productivity," but the latter provides sharper emphasis on the intra- and inter-sectoral market exchange processes and their effect on regional product and the distribution of income among the region's population.

outlays for assembly inputs. The Northeast appears capable of supporting substantial heavy industry complexes with other resources, however, such as petroleum and chemicals.

A second major difference lies in the interaction of the rural and urban complexes. The industrialization process in the Center-South was accompanied and largely made possible by a dynamic agricultural sector. Not only did agriculture--principally coffee--generate large sums of foreign exchange and domestic savings for industrial investment, it provided a sizeable and diversified market for manufactured products, both capital and consumption goods. In addition, it ensured an adequate supply of food items, at relatively low prices, to the cities' sector. The latter was vital in the expansion of the urban market for manufactured products and in the generation of savings for housing and infrastructure development in the urban centers.

In short, the urban-rural exchange system provided the dynamic linkage between the industrialization and agricultural growth processes in the Center-South. In this respect, the situation in the Northeast is far from similar. The region's agricultural sector, although a net earner of substantial foreign exchange resources, has performed this function erratically; moreover, the principal earners of foreign exchange--sugar, cacao and cotton--confront increasingly precarious international market conditions, as well as extreme competitive pressure from domestic producers outside the region (principally in the Center-South). The region's foreign exchange earnings, in any case, have tended to be spent largely on industrial imports to the Center-South, giving rise to the "triangular" trade pattern which was first given wide public recognition by Celso Furtado (see Chapter 2 for a description of the "triangular" trade pattern).

As a market for manufactured products and generator of domestic resources for investment, Northeast agriculture has also performed far from optimally. The significance of this failure is simply dramatized by the fact that two-thirds of the region's population reside in the rural area, and a majority of its work force are directly engaged in agriculture.

Also in contrast to the Center-South, the Northeast rural sector has not supplied food in the quantity or at the relative prices needed to adequately sustain the expansion of an urban market for industrial output.

Finally, population migration patterns differentiate the growth processes of the Northeast and the Center-South. In the

latter region, industrialization drew on an influx to the cities of former rural workers (a large portion of them Northeasterners) for a ready supply of low-cost labor. In addition, sizeable immigrations from Europe and Japan provided skilled labor for both industry and agriculture.

In the Northeast, there is also a pronounced rural-to-urban migration flow. Over all, SUDENE has estimated that the region's urban population is growing at about 4.7% per year, its rural population by only 1.1%.[12] However, migrants do not possess readily marketable skills to the same extent as occurred in the Center-South. Virtually no immigration of skilled farmers has taken place. In addition, the influx to the cities has apparently not been in response to effective and growing demand for urban labor, but has primarily been a reaction to the comparative stagnation and privation of the rural sector.

Thus, on the one hand, the growth of the Northeast's urban population has not constituted a proportional increase in the effective market for manufactured foods. On the other hand, it has substantially increased the pressure on the available urban food supply, while raising the costs of urban infrastructure and administration more than proportionally to the expansion of the tax revenue base.

It is also worth noting that public development investments in the Center-South during that region's "take-off" period were financed almost exclusively from tax revenues generated within the region. Northeast development expenditures have required large net transfers of revenues from the Center-South (which, incidentally, pays about 90% of total federal taxes).[13] The SUDENE 34/18 program of investment incentives, in particular, is almost entirely dependent on business savings generated in the Center-South's private sector. To this extent, the region's industrialization is vulnerable to the vagaries of a unique political relationship critically involving the willingness of the private entrepreneur from the Center-South to continue to invest in the Northeast. The instability inherent in this relationship has been amply illustrated by the series of recent attempts on the part of Center-South interests to have the 34/18 program curtailed and to divert 34/18 resources back to the Center-South.

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[12] SUDENE, *III Plano Director, op. cit.*, p. 24.

[13] *Survey of the Brazilian Economy, 1966, op.cit.*, p. 29.

Future Outlook

The preceding and other considerations suggest that it would be dangerously illusory to presume, on the basis of superficial similarities, that the current phase of the industrialization process in the Northeast will necessarily proceed to the same result as did the phase just ended in the Center-South.

The rapid increase of urban population in the region will likely continue through the forseeable future. Indeed, it might be argued that it should proceed even faster, implying no growth or a net reduction of the region's rural population, in order for per capita income and levels of savings to rise in the rural sector.

Even at its current rates of increase, the burgeoning urban population creates increasing demands on available food supply, and thus, directly on the food marketing process. Effective supply must not only keep pace with urban population increase and its possible acceleration, but it must also expand fast enough to cause a decline in real food prices. Otherwise, discretionary consumer income will not grow rapidly enough to sustain the current industrialization process.

Traditionally, the food supply problem has been viewed forward from the level of the agricultural producer. Investigation of the exchange processes highlights the importance of marketing channel efficiency in reducing transportation losses and improving the quality of food delivered to urban consumers. Additionally, the exchange processes underscore the fundamental bearing of the organization of the urban marketing enterprise on real food prices. Simply put, the traditional urban marketing enterprise should not be expected to be the simultaneous nexus of incentives for expanded agricultural output and lower real food prices. This assertion is dealt with in the following three chapters. Moreover, the technological revolution which the region's agriculture must undergo will necessarily involve, among other things, the modernization of techniques for the marketing of manufactured farm inputs. Chapters 7 through 10 deal with this aspect of the problem.

Of prime importance at this juncture of the report is the understanding that the current Northeast industrialization process is in jeopardy as a result of: (1) the absence of adequate growth of effective demand for urban products in the rural sector; (2) the extremely slow expansion of corresponding urban markets, largely as a result of high food prices relative to prices of other goods; and

(3) the unique political basis of the region's current industrialization process.

Thus, the optimism expressed by Hirschman and others with regard to the region's industrialization must be carefully qualified. Northeast industrial investment has accelerated sharply as a result of the SUDENE incentives program and basic improvements in economic infrastructure. The changing structure of the region's industry, as implied by the Article 34/18 investments, is potentially richer and more dynamic in forward and backward linkages than the traditional structure.

Nevertheless, the dramatic expansion under way in regional industrial capacity is not being adequately matched by the growth of effective demand for industrialized products in either the rural or urban markets. The beneficial economic impact of the new investment stream is thus in danger of being throttled. The political contract underpinning the 34/18 program will be increasingly in danger of recision to the extent that creation of capacity exceeds the effective regional demand for goods, profitability expectations go unrealized, and the willingness of Center-South entrepreneurs to supply investment resources declines accordingly.

Conceptually, the SUDENE 34/18 program is a masterpiece of development strategy (and one which many countries could profitably study). It has been skillfully and effectively administered. Yet it should be recognized as a form of "forced feeding" of the industrialization process. Its success will ultimately depend on the extent to which: (1) the potential transactions-productivity of the new industries is actually realized, (2) the rural sector is activated out of stagnancy, and (3) effective demand for industrialized products is developed in both rural and urban markets. In other words, the exchange process within the Northeast's industrial sector and between that and other sectors of the regional economy will play a decisive role in determining the viability of the current phase of Northeast industrialization. "Forced feeding" of the marketing process appears now to be a necessary concomitant of regional industrialization.

Analysis of Entrepreneurship, Industrialization and Regional Development

Research Objectives and Procedures

In examining the process of industrialization in the Northeast, three operational objectives were established.

First, an attempt was made to determine how owners or managers of firms in the region formulate policies and make decisions with regard to: (1) the employment of resources, and (2) the firm's growth rate in terms of sales. The objective here was to determine what differences exist between efficient and inefficient firms with regard to policy formulation and decision-making, and how these differences relate to rates of sales growth.

The criterion of efficiency was based on the value of a firm's output (excluding raw materials costs) per person employed and per monetary unit invested. Both denominators were given equal weight. Policy and decision-making procedures were studied specifically in relation to:

1. managerial perception of the effect of competition on a firm's operations;
2. the nature of a firm's relationships to raw material and other input suppliers;
3. marketing and distribution activities; and
4. operations internal to the firm.

Second, the impact of the general economic, technological and sociological changes occurring in the region on decisions of the private industrial sector to expand capacity and increase real value of output was considered. Particularly important in this regard was the responsiveness of entrepreneurs to the incentive and facilitative programs of government, and their sensitivity to over-all business and market conditions.

Third, an attempt was made to evaluate the changes occurring within the region's industry in terms of the over-all Northeast economy. The emphasis here was on the value and geographic source of inputs; the value and geographic destination of outputs; transactions-productivity within industry and between the industrial and other sectors; and the relationships between the urban and rural complexes.

Although a general summary investigation of Northeast industry was performed, primary attention was given to the industrial establishment of the Greater Recife area and its interaction with the four-state area of Pernambuco, Alagoas, Sergipe and Paraiba, i.e., the Recife "foodshed."

Within Recife's industrial establishment, three industry groups were studied intensively. These were: (1) food processing, (2) consumer goods and (3) agricultural input manufacturing. The first was selected because of the effect of relative prices of processed foods on consumers' real discretionary income. The second

was studied on the theory that the real prices and available variety of consumer goods are critical determinants of how consumers allocate discretionary income.

Simply stated, the theory holds that the availability of a wide variety of relatively low-priced consumer goods acts as an incentive for consumers to seek additional income or spend discretionary income already held on non-food consumption. If such goods are not available, discretionary income and additions to income may be dissipated by hoarding or inflationary hedges rather than by addition to effective demand for industrialized products. Particular interest was attached to the effect of consumer goods availability as an inducement for rural residents to work more and spend additional income on non-food consumption. The problem here was to determine how the distribution and marketing of consumer goods is related to the development of effective demand for such goods.

Agricultural input manufacturing was investigated in depth because of the critical role of this industry in the expansion of agricultural production. Again, primary attention centered on the problems of marketing technologically superior farm inputs in the appropriate areas, in a timely manner, in the necessary combinations and at prices making their use economically justified.

All firms in each of the three industry groups were studied. Where there were more than ten firms in a particular industry sub-group, the leading firms were studied, together with a random sample of the remaining firms. Table 3.2 presents the industry groups, sub-groups and respective numbers of firms studied.

Table 3.2 Industrial Groups, Sub-Groups and Firms Studied

	Number of Firms Studied
A. Food Processing	42
1. Wheat processing and baking	11
2. Beverages	9
3. Vegetables	4
4. Fruits	4
5. Meats	4
6. Milk	2
7. Packaging materials	8
B. Agricultural Inputs	10
1. Fertilizers	5
2. Farm implements	3
3. Irrigation tubes	2

Table 3.2, Continued

	Number of Firms Studied
C. Non-food Consumer Goods	31
1. Textiles	8
2. Furniture	8
3. Electrical appliances	3
4. Soap	4
5. Consumer goods	8
TOTAL	83

Data were collected through extensive interviews with the owners and the general, production, and sales managers of each firm. Important secondary information was supplied by SUDENE, FUNDINOR and Dunn and Bradstreet.

Findings

Characteristics of Efficient Enterprises - The relationships most associated with efficient enterprises in at least 60% of the industries studied indicate that the more efficient firms:

1. feel the competition does not make it difficult to increase output,
2. regard their market as reliable, stable and predictable,
3. generally have a more rapid rate of growth in output,
4. have a higher concern for marketing,
5. attempt to differentiate their products from those of competitors,
6. have a larger value of sales,
7. employ a larger amount of capital per worker,
8. have a higher rate of reinvestment, and
9. have a higher rate of capacity utilization of their investment.

Typically, the more efficient firms were found to have a more rapid increase in their value of sales, even though the value of their sales is greater than for less efficient firms. The managers of these firms do not perceive that their competitors make it difficult to increase output; they are relatively confident of a secure market for their output. They are more "marketing-oriented," as opposed to being primarily concerned with production or finance problems. They consciously pursue policies of product differentiation. Nevertheless, their costs of advertising and distribution (as a percentage of sales) are no greater than those of the less

efficient, non-marketing-oriented firms. The relatively efficient firms are also more capital intensive, have a higher rate of reinvestment, and utilize this investment more.

The preceding profile of the more efficient firms is not especially surprising. On a comparative basis, most of the characteristics cited would normally be associated with more efficient enterprises.

Several particular features of the more efficient firms are, however, worthy of special mention. First, they tended to purchase raw materials directly from producers rather than from intermediary suppliers, and to extend technical assistance to their raw materials suppliers. This suggests that the more efficient firms are also more effective change agents and play an important role in developing between-firm linkages in the industrial sector. Second, the more efficient firms generally raised prices at lower rates than did the less efficient. Their pricing policies reflected greater concern with the reduction of gross margins as a means of stimulating sales. The product lines of these firms also tended to be more diversified and thus presumably offered a higher degree of incentive to consumers to work and earn more in order to be able to consume a wider variety of goods. Finally, fewer workers were employed per unit value of sales, yet average wages paid by the more efficient firms were typically higher in relation to the less efficient.

The preceding considerations illustrate one of the dilemmas which has beset the SUDENE 34/18 program since it began. In view of the high levels of unemployment prevailing throughout the region, SUDENE has given priority in the use of 34/18 funds to relatively labor intensive industrial investments. Still, the bulk of 34/18 applications implicitly have rather low labor/capital ratios. Hirschman found that one job was being created per the equivalent of US$7,600 invested.[14] He noted, however, that this was to be expected in light of the concentration of 34/18 investments in capital and intermediate goods industries. He also pointed out that the industries which will develop to service the 34/18 enterprises will tend to have higher labor/capital ratios.

Study of the industrial sector by the MSU/SUDENE marketing research team supports Hirschman's observations. In addition, it has revealed (again, not too surprisingly) that within an industry

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[14] Hirschman, *op.cit.*, p. 21.

group the more capital intensive firms are more efficient, employ more modern price and marketing policies, develop stronger linkages to other industry groups, and pay higher average wages. These considerations militate against an indiscriminate preference for relatively labor intensive 34/18 investments. An untoward effect of such policy could be to deprive more progressive entrepreneurs of appropriate advantage under the 34/18 program. In the extreme, exaggerated emphasis on the direct employment consequences of proposed 34/18 investment could tend to shift the over-all structure of these investments back in the direction of the traditional, less dynamic, and linkage-poor industries.

Short-term Growth: Leading and Lagging Industries - In investigating the industrial sector, an attempt was made to identify the particular industries which appeared likely to lead or lag in the sector's short-term growth. Each of the firms studied was considered in light of its own perceived ability to double output and sales within a five year period. The prospects of acquiring the investment resources, factor inputs, management personnel and labor required for this purpose were taken into account. Each firm's perceived sales potential--based implicitly, of course, on its expectations with regard to effective demand or the development of markets for its products--was also considered.

The difficulties inherent in this type of analysis are obvious. Relative degrees of optimism and of caution on the part of managers strongly influence the results and are not necessarily related to actual growth potential. Moreover, the one-by-one study of firms probably does not yield entirely valid conclusions in the aggregate. If all firms in an industry group attempt to expand sales simultaneously (viewing the demand curves confronting their individual firms as being relatively elastic), the total demand for the industry's product may turn out to be sharply inelastic and, thus, the aggregate expansion possibilities considerably less than the sum of the individually perceived possibilities.

Despite these and other analytical problems, the effort to identify likely leading and lagging industries can shed some light on the extent of short-term integration in Northeast industrial growth. Taken together with other analyses, the results may be relevant to policies designed to promote regional industrial investment.

The 15 industry sub-groups of the food processing, agricultural inputs and non-food consumer goods industries were categorized

into "leading," "potentially leading," "contributing" or "lagging" groups. The results are presented in Table 3.3.

Table 3.3 Classification of Growth Potential of Industry Sub-Groups Studied

A. Leading Group
- Beverages
- Vegetable Oils
- Farm Implements
- Electrical Appliances

B. Potentially Leading Group
- Wheat Processing & Baking
- Fruit Processing
- Packaging Materials
- Irrigation Tubes
- Textiles

C. Contributing Group
- Meat Processing
- Milk Processing
- Fertilizers
- Furniture
- Soap

D. Lagging Group
- Consumer Goods

One of the implications of the above presentation is that the manufacturing of farm implements, irrigation tubes and fertilizers are apparently likely to grow at uneven rates. To the extent that, for technical reasons, a variety of such agricultural inputs (including improved seed varieties, pesticides, insecticides, etc.) must be made simultaneously available to farm producers in order to maximize input complementarity, the possibility arises that special efforts should be undertaken to stimulate the relatively slow-growing input manufacturers to accelerate their rates of output expansion.

Another important consideration in terms of regional economic growth is the source of inputs for local industry. Over all, it is estimated that approximately 45% of the value of non-labor industrial inputs in the Recife area is represented by inputs purchased from the Center-South and international sources.[15] Two industries in the "leading" group--farm implements and electrical appliances--purchase even greater proportions of their inputs outside the region. The implication here is obvious: continued close attention to the development of intra-regional supplies of industrial inputs is critical. Inter-industry linkage potential may not otherwise be adequately developed. SUDENE policy under the 34/18

[15] SUDENE/MSU Industrial Survey, 1967.

program has justly emphasized this priority and should continue to do so to the extent possible and consistent with the region's resource endowment.

Output Capacity and Demand for Industry's Products - Earlier in this chapter, concern was expressed with regard to the "purchasing power" problem. In essence, the concern is that Northeast industrial output capacity (or sales potential) may be increasing in excess of the growth of effective demand for industrial goods in both urban and rural markets. Contrary to the presumed implications of Say's Law, supply does not necessarily create its own demand. The rapid advances in industrial investment under the SUDENE 34/18 program may thus fail to achieve their expected impact on regional development in the absence of special efforts to bolster consumer purchasing power, i.e., real discretionary income.

The specific nature of this problem may be illustrated as follows. Assume, as suggested by Hirschman, that capital stock in the Northeast will double over its 1964 level as a result of 34/18 investments realized and approved through mid-1967. Assume that the doubling will actually occur at a more or less even rate over the five year period beginning in 1967, and that output capacity will also thereby be doubled. The doubling of output capacity does not, of course, necessarily follow from a doubling of capital stock. The assumption is plausible, however, recalling that capacity is the variable under discussion, and that the existing capital stock is not merely being identically reproduced. The new capital stock is presumably of better quality, i.e., has higher technical coefficients of output.

Consider the Greater Recife area alone, and only the food processing industry. It is estimated that total output of the Recife food processing industry in 1967 was equivalent in value to US$64 million and that sales of this output were distributed as follows:

	(Millions of Dollars)
To Recife:	29.5
To the 4-State Area:[a]	25.9
Outside the 4-State Area:[b]	8.6
	64.0

[a] Pernambuco, Alagoas, Sergipe and Paraiba, excluding Recife.

[b] Including exports.

Recife's demand for processed foods was met from the following sources in 1967:

	(Millions of Dollars)
From Recife Industries	29.5
From the 4-State Area:	2.1
From Outside the 4-State Area:[a]	7.4
	39.0

[a]Including imports.

Projections based on interviews with processed food manufacturers in Recife indicate that by 1971 the industry's output sales potential may reach a total of US$82.5 million equivalent, to be sold as follows:

	(Millions of Dollars)
To Recife:	38.0
To the 4-State Area:	33.4
Outside the 4-State Area:	11.1
	82.5

In the same year, demand for processed foods in Recife is expected to be met from the following sources:

	(Millions of Dollars)
From Recife Industries:	38.0
From 4-State Area:	2.6
From Outside the 4-State Area:	10.1
	50.7

The estimated totals of consumer incomes in Recife for 1967 and 1971, respectively, are US$329 million and US$417 million. The 1971 figure implies a 6% cumulative annual increase in total consumer income over the period and a 4.7% annual increase in the urban center's population.

Assuming now that Recife output-sales potential in processed foods doubles over the five year period to US$128 million and that sales to the 4-state area (excluding Recife) and outside the 4-state area (including exports) achieve their expected totals by 1971 (US$33.4 million and US$17.2 million, respectively, then US$77.4 million in processed foods would be produced and available

to supply the Recife demand. Assuming still further that processed foods produced in Recife entirely displaced purchases from within and outside the 4-state area, there would be a net excess of production, or of utilizable production capacity, of about US$26.7 million, i.e., US$77.4 million minus US$50.7 million.

To clear the market of this excess, total 1971 consumer income in Recife would have to increase to almost US$630 million, an increase of more than 90% over the 1967 level, or by 14% cumulatively each year from 1967 to 1971.

Of course the doubling of output in the local food processing industry would itself generate an appreciable increase in consumer income. Nevertheless, the entire industry sector now generates less than 15% of consumer income in Recife, and food processing only a quarter of the amount generated by all industry. Clearly, supply alone would fall far short of creating its own demand in this situation.

The extent to which prices would have to fall in order to clear the market would almost certainly be below the production costs of all, or at least all but the most modern, food processors. Exit from the industry of the bulk of the less efficient firms as a result of drastic price declines would, of course, remove a corresponding source of consumer income.

The preceding example of the "purchasing power" problem is illustrative, based on a particular set of simplifying assumptions, and dependent on the accuracy of the relevant estimates of parameter magnitudes. While it is not intended to predict imminent calamity in the region's industrial sector, it is sufficient to underscore the delicate relationships between real consumer income, effective demand for manufactured products, and the absorptive capacity of the region's economic system for increases in industrial output.

The problem could also, of course, be illustrated in terms of the rural market's effective demand for manufactured products and the underlying requirements for rural consumer and producer incomes.

Distribution, Marketing, and the Development of Effective Demand - A special case study of beverage firms in Recife by the MSU/SUDENE research group amply demonstrates the importance of distribution and marketing programs in expanding and strengthening the effective demand for consumer products.

The beverage industry is comprised of two beer and soft drink bottlers and five exclusively soft drink bottlers. The two beer

bottlers are members of Brazil-wide chains, as are three of the soft drink bottlers.

Until 1965, there was only one beer bottling firm in Recife. With the entry in that year of the second firm in the industry, the original bottler was prompted to improve its plant facilities and adopt a smaller 10-oz. bottle designed to appeal to consumers who do not want or cannot afford the customary 21-oz. bottle. The local production of beer has increased almost 300% since 1965. Both firms now use the smaller 10-oz. bottle and have rapidly expanded and modernized their plant facilities. An additional 400% combined increase in capacity was being planned at the end of 1967.

Much of the dramatic expansion in local beer production is, of course, in substitution of beer previously purchased from outside the region. Nevertheless, a significant portion is the result of more widespread and aggressive marketing programs in the adjacent rural areas.

Similarly, sales of the two leading soft drink manufacturers have been rapidly expanding due to streamlined distribution systems, use of modern production and transport equipment, aggressive promotional campaigning and the extension of sales territories into the rural areas. Penetration of the rural market has been accomplished through a combination of decentralized production and warehousing facilities, efficient distribution systems and extensive advertising.

The success of firms in the beverage industry in reducing costs, narrowing margins and expanding both urban and rural markets for their products through modern distribution and marketing techniques is a lesson to be carefully studied by firms in other industries and also by the makers of regional policy regarding industrial development.

With regard to the supply of productive factors from industry to the agricultural sector, it was found that distribution systems for the kinds of farm inputs--such as fertilizers, insecticides, fungicides, irrigation and other equipment--necessary for technological revolution in the region's agriculture are both inadequate and costly.

In most of the rural areas surveyed, it was found that modern farm inputs were not available locally for sale, and that there was a close correlation between the use of purchased farm inputs by producers and the availability of such inputs in local markets. The high degree of statistical correlation between use and availability does not, of course, establish a causal relationship. Much other

evidence suggests that under current farm practices the association of input and product prices is such that the use of purchased inputs may not be economical. Nevertheless, the delivery price of such inputs is significantly affected by their respective distribution systems; low volume distributors must spread the burden of fixed marketing costs over relatively few factor units. High delivery prices and low volume usage are also connected to less-than-capacity utilization of input production facilities and, thus, to high costs of production.

Complicating problems are the lack of reliable experimental evidence on the technical output coefficients of modern input usage and the widespread ignorance of farmers with regard to the potential benefits of such input usage. There are also significant problems of credit availability for the purchase of farm inputs. These types of problems are dealt with more fully in Chapters 7 through 10.

No claim is made here that the introduction of modern distribution and marketing techniques for manufactured agricultural inputs will by itself lead to rapid expansion of farm output. Still, it seems evident that the absence of rural distribution systems for manufactured inputs, e.g., chemical fertilizers, or the existence only of high-cost, low-volume systems, is a major factor contributing to the low levels of usage.

Conclusions and Recommendations

Beyond any doubt, the process of industrialization in the Northeast has been given a tremendous boost forward primarily as a result of the SUDENE 34/18 incentive program and the massive public investments which have been taking place in highways, power and related infrastructure. Industry has progressed more in the past five years than in any other such period of the region's history.

Capacity and Demand - Optimism for the immediate and long-term future is warranted, but must be carefully qualified. The creation of industrial capacity, if allowed to exceed the rate of increase in effective demand for industrial products by too wide a margin, could lead to serious adverse consequences for the entire regional economy. Much evidence has been found indicating that industrial capacity in the Northeast is likely to be increasing significantly faster than corresponding demand.

It is our view, however, that the solution to this problem does not lie in the curtailment of investment. We do not argue,

for example, that project approval or fund releases under the SUDENE 34/18 program should be slowed in the aggregate, or that the rate of deposits should be restricted.

The basic recommendation in this regard is twofold. First, regional industrialization policy should give high priority to incentives and facilitative programs for the development of markets by the private sector. Given present price relationships, the region's market for manufactured goods is extremely shallow and narrow. Most of the rural sector is outside of it, both for industrialized agricultural inputs and for non-food consumer goods. Broad ranges of the urban community are also isolated. It is our contention that current price relationships can be significantly and appropriately altered through the adoption of modern distribution and marketing techniques.

If the purchasing power of consumers is, however, limited and inadequate, how can producers and final distributors be motivated to increase output and sales? Resolution of the apparent paradox is almost entirely definitional. The purchasing power of consumers, or level of effective demand, is a function of the relative prices of the goods being consumed. Prices, in turn, are functions of production and distribution costs. Furthermore, efficient marketing practices, by increasing sales volume, can reduce both distribution and production costs and thus lead to a decline in prices and expansion of effective demand.

At present levels of income, the extent to which demand in the Northeast for manufactured goods can be expanded is, of course, critically determined by relative food prices. Even at current income and food price levels, however, there appears to exist substantial leeway for the expansion of non-food markets through efficiently employed volume-increasing, cost-reducing marketing and distribution techniques.

Still, in practical terms, a certain amount of "forced feeding" of the marketing process for non-food commodities will probably be necessary, particularly in the penetration and development of rural market areas. It is unlikely that many individual firms will assume the high risks, uncertainties and costs of market development on their own initiative and entirely with their own resources.

The case of industrialized farm inputs is illustrative. The critical first issue to be determined here is under what firm management practices and price relationships fertilizer, for exam-

ple, is an economically feasible input. On the basis of these determinations, a reasonable estimate could be made of potential market size, i.e., the probable volume of sales in a particular area. Working back, then, through the system, estimates could be made of distribution and production costs. Expenditures on this type of research could be financed or subsidized by an appropriate governmental agency. If subsidies were necessary to launch operations, these might be included in governmental financing of the required new or remodeled distribution facilities.

Incentive devices for penetrating rural markets for non-food consumer goods might be similarly designed. The experience of the beverage industry in Recife could profitably be studied in this regard.

The creation of effective demand within the region is also, in part, a function of the linkage-richness of the industrial establishment. Here the recommendation involves primarily an increase of existing effort, rather than a rearrangement of priorities. Under the SUDENE 34/18 program, utilization of the region's raw materials has always ranked high in the criteria for evaluating investment proposals. This emphasis should be maintained and strengthened as much as possible. Steel, petroleum and chemical complexes are, of course, prominent examples of industries with strong backward and forward linkages. So also, however, is the food processing industry, even though it is one of the largest and oldest components of industry in the Northeast. Food processing should not be slighted in the search for new dynamic industries to modify the region's industrial sector.

The Scope of Industrialization Policy - Given the critical role of relative food prices in determining the demand for industrial products, it would seem logical to include within the purview of a general industrialization program enterprises which can positively influence food price levels. Specifically, modern urban food marketing enterprises, although not classified as industries, bear heavily on the industrialization process. This assertion is documented fully in the following three chapters. The essential point here is that regional industrialization policy, particularly as executed under the SUDENE 34/18 program, should not be exclusively confined to the industrial sector *per se*. It should also take account of those economic activities, such as food distribution and retailing, which vitally affect growth in the industrial sector.

The Development of Marketing Skills - An inflow of new, up-to-date business talent has generally accompanied the 34/18 investments from the Center-South. As a result, competition has livened in several industries, such as beverages, and management practices have begun to improve. While some improvements in distribution and marketing practices have been noted, additional efforts to upgrade management skills in these areas should be undertaken.

One of the problems confronting such efforts in the Northeast is the absence of a university or similar institution providing training of the appropriate kind and level. With the qualified exception of the University of Bahia, there was no institution offering advanced courses in distribution and marketing prior to 1968.[16] In the long run, this institutional gap should be closed by creating the appropriate educational facilities within the region. In the meantime, a variety of short-term solutions should be given careful consideration.

First, an incentives scheme could be established to encourage all firms in the Northeast to send key management personnel for advanced training in business schools in the Center-South and outside Brazil. The training costs could be divided equitably between the private firm and the sponsoring government agency. For example, under the 34/18 program, training costs could be included in the total costs of an investment project. It might be desirable to require of participating firms that personnel trained under such a program be kept in the Northeast for some minimally acceptable period, or that reimbursement be made if trained personnel are transferred elsewhere. Alternatively, a general advanced management training fund could be established through mandatory contributions under the 34/18 program. A percentage of all 34/18 deposits could be allocated to the fund. Trainees could be selected from within the region on the basis of open competition, and/or participating firms could nominate a number of candidates proportional to their contributions to the general fund.

Second, advanced management seminars and intensive training courses could be instituted periodically in Recife. Personnel

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[16] Since 1968, the School of Business and Administration of the Pernambuco University Foundation included in its curriculum, of the last academic year of Business Administration, subjects such as Marketing Administration, Sales, Advertising and Production Administration. The School of Business of the Federal University of Pernambuco has also established similar subjects in its curriculum.

from Brazilian and other universities and other sources of relevant expertise could be obtained to conduct the session. Emphasis would be given to modern practices in marketing and distribution. This type of program could also be financed from a general fund under the 34/18 program, with contributions and assistance from SUDENE, local federations of industry, industrial productivity centers, commercial associations, FUNDINOR and similar organizations.

CHAPTER 4

THE CONSUMERS OF RECIFE

This chapter presents some of the findings of a survey of 354 housewives located within the city limits of Recife, Brazil.[1] The purpose of presenting these findings is to develop a foundation of understanding on which the analysis of the distribution system can be built, as well as to examine the hypotheses concerning consumer behavior. Two groups of hypotheses upon which this research was based are relevant to the present chapter:

1. Given that consumer real income increases from changes in the food distribution channel, what effect does this increase have on expenditures for food and non-food items and savings? Further, what differences are there in consumer reactions to real income changes by different income levels of consumers, i.e., high vs low income consumers?

2. What constraints do consumers place on the marketing system by their shopping habits, needs and desires? In what manner do consumers react to retail and institutional changes? What factors are important in understanding consumer acceptance or rejection of change? How can consumers be influenced to accept change more easily?

To answer the above questions, first the nature of the consuming units will be analyzed, and second the purchasing patterns--the consumer-retailer interaction--will be viewed.

Demographic Characteristics of Consumers

Background

Recife, the capital of Pernambuco, is the largest city in Northeast Brazil and the main trading center for both the humid coastal zone, where sugar cane is the main crop, and the drought-ridden interior Agreste-Sertão area. The city has a population of approximately 1 million, with an estimated growth rate of 4% per year.[2] This population growth rate must be matched by an

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[1] All data in this chapter stem directly from this survey, except where footnoted. Particulars of the survey design can be found in Appendix A.

[2] Instituto Brasileiro de Geografia e Estatística, *Anuário Estatístico do Brasil - 1965* (Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística, 1965), Vol. 26, p. 32.

increase in output if the present urban level of income, rate of employment and well-being are to remain at the same level.

The principal industry of Recife has been sugar, but in the past few years an intensive investment program has started industrial diversification. Migrants make up a large share of the population. Only 64% of the respondents claimed to be "from" Recife, 12% were from coastal areas in the Northeast, 21% had migrated from the non-coastal interior of the Northeast, and only 3% had come up from the more prosperous South. Thus, like many Latin American cities, a large portion of the population pressure comes from the rural-urban migration which characterizes the development process.

Age

The age distribution of the population reflects inadequate diet and a high incidence of disease. In 1960, 28% of the population were under 10 years of age, 50% were under 20, and 21% were over 40 (Table 4.1). The mean age was 24.5 years and the median was 22.4 years.[3] For comparison, in 1960 the median age in the United States was 29.5 years.[4] Thus the working population is relatively small. Although life expectancy is short, families are large, with an average family size of 6 being reported by the respondents. A family unit is defined as those people who eat and live together. Thus the term is broader than just the immediate family and includes, in some cases, more than one breadwinner as well as dependents.

It is interesting to note that the median age of the housewives interviewed was 39 years of age. In comparison, the median age of U.S. housewives in 1966 was 45.[5]

Education

To assess the level of education of the housewives, they were first asked if they could read. Of the respondents, 72% reported they could. Those who claimed literacy were then asked to

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[3] Brazil, Banco do Nordeste do Brasil, S.A., *Abastecimento de Gêneros Alimentícios da Cidade do Recife* (Fortaleza, Ceará: ETENE, Banco do Nordeste do Brasil, S.A., 1962), p. 23.

[4] U.S. Bureau of the Census, *Statistical Abstract of the United States: 1967* (88th ed., Washington, D.C.: U.S. Government Printing Office, 1967), p. 24.

[5] *Ibid.*, p. 38.

Table 4.1 Population Distribution of Recife According to Age Groups in 1960

Ages	Percent	Cumulative Percent
0 - 9	27.7	27.7
10 - 19	22.4	50.1
20 - 29	16.6	66.7
30 - 39	13.2	79.9
40 - 49	8.9	88.8
50 - 59	5.7	94.5
60 - 69	3.6	98.1
70 - 79	1.5	99.6
80 & over	0.4	100.0
Total	100.0	

SOURCE: Brazil, Banco do Nordeste do Brasil, S.A., *Abastecimento de Gêneros Alimentícios da Cidade do Recife* (Fortaleza, Ceará: ETENE, Banco do Nordeste do Brasil, S.A., 1962), p. 23.

read a sentence and were graded for ability to read out loud and for comprehension. Of those who claimed literacy, 70% read easily, 25% read with difficulty and 5% could not read at all. Further, only 83% of those claiming reading ability understood what they had read when tested for comprehension. Thus, of all housewives interviewed, only 50% were functionally literate.

After literacy was determined, the level of schooling became relevant. Given the above level of literacy, it was not surprising that 21% had never attended school and 25% had only one to three years of school. Thus, though the mean level of schooling for the respondents was 5.6 years, the median was 3 years.

In conclusion, most housewives have little education on which to base their purchasing decisions (housewives made purchasing decisions in 80% of the households). Further, it should be kept in mind that the use of the printed media (newspapers, magazines and handbills) to foster changes in behavior can only be as effective as the literacy rate allows.

Employment and Income

Only 5% of the respondents replied that the head of the household held down two or more jobs. It seems that "moonlighting"

must be restricted to a highly visible minority. Thirty-two percent of the respondents reported that someone other than the head of the house had a job and in 7% of the families, at least 2 other persons worked besides the head. Thus, the head of the household provides the major support for the family.

A total of 93% of the heads of households were reported to be working. The distribution of occupations among household heads as reported by the housewife respondents were as follows: 7% worked in food distribution, 6% in non-food distribution, 2% in food industry, 10% in non-food industry, and 27% in government. The remainder worked in services, construction, or were *"desemprego desfarcado,"* i.e., underemployed in non-permanent marginal jobs such as guarding cars on the streets, scavenging crabs from the river, collecting paper, etc.

With respect to the others who worked in the family, 1% worked in food distribution, 12% worked in non-food distribution, none worked in food industry, 12% worked in non-food industry, and 32% worked for the government. The remaining worked in various sectors other than the above.

The mean family income was reported by the respondents to be NCr$133 (US$42) per week or NCr$5,870 (US$2,174) per year. On a per capita basis, this income amounts to NCr$967 (US$358) per year. The median per capita income was NCr$433 (US$160) per year. The skewness of this distribution will be returned to shortly. This income does not include goods produced and consumed at home. However, the urban consumer grows little at home.

A note of caution should be sounded with respect to the income figures cited above. As with all income determination questions, especially when applied in areas where little record-keeping occurs, the responses were subject to respondent bias. Some bias was caused by non-wage or non-monetary income which was not reported. Examples of these wages are interest, capital gains, meals given employees, gifts given maids, etc. Another bias was introduced by making the time period short--1 week. This was done in order to keep within the respondents' time perspective. Possibly, however, the time period was so short that the respondent was embarrassed to state the true, but small, income, and thus tended to exaggerate. Also, the housewife may not know the income on a weekly basis if it does not correspond to a weekly paid salary. Most were biweekly or monthly. Finally, the housewife may not know the income that her husband makes at all. In any case, the

housewife would tend to overstate or refuse to answer to avoid interviewer disapproval.

A third bias occurred to a non-measurable degree as a result of the sample design. The sample was drawn, as noted in Appendix A, from a census of dwellings in Recife. Because of the difficulty in counting in the disorganized slums, there may have been some undercounting of the poorest homes. Further, the homeless were excluded entirely. These two factors would tend to under-report the low income families, making our income calculations higher than actual.

It would be reassuring if the income figures could be compared with secondary data, but none exist for a comparable population or time in Recife. There are indications, however, that the results are somewhat biased in an upward direction--first, the professional judgment of local economists of SUDENE and second, the fact that the surveys of retail sales do not show enough sales to satisfy the purported income. These sales figures have a bias in the opposite direction due to merchant fear of tax evasion exposure. However, the sales figures are more reliable than income data because they are built up from cost and margin data as well as being obtained directly from respondents. With these warnings in mind, the income analysis can be continued.

The survey on "Problems of Food Supply in Recife" (1962) reported that more than 30% of the wage earners did not receive the minimum wage.[6]

The distribution of wage income indicates that 48% of the households received only 13% of the income. The top 14% received 51% of the income. It is important to note that other income, particularly rents and profits from investments, add income to the upper strata while scavenging and irregular jobs add income to the lower levels. Table 4.2 presents a distribution of wage incomes reported in the consumers survey. A tremendous disparity among the levels of income is evident.

Visually, this disparity can be presented in a "Lorenz curve" (Figure 4.1). Note the curves of San Juan, Puerto Rico; La Paz, Bolivia; and the United States for comparison. Clearly, Recife has greater income disparities than these locations.

The implications of these disparities need to be spelled out. When considering the kinds of goods that can be consumed, it is

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[6]Brazil, Instituto Joaquim Nabuco de Pesquisas Sociais, *Problemas do Abastecimento Alimentar do Recife* (Recife, P.E.: Instituto Joaquim Nabuco de Pesquisas Sociais, Ministerio da Educação e Cultura, 1962) p. 133.

Fig.4.1 DISTRIBUTION OF FAMILY INCOME (LORENZ CURVE) 1966 - 1967

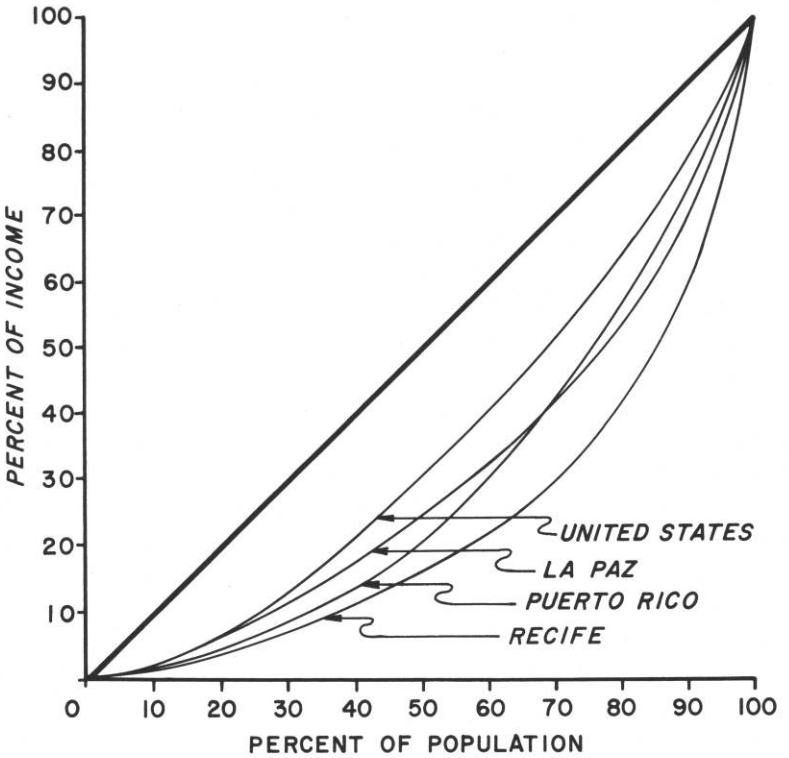

Table 4.2 The Distribution of Family Income and Average Propensity to Consume

Income Level* NCr$ Per Week	% Families in Group	% Income in Group	Cumulative % Families	Cumulative % Income	Average Propensity to Consume Food
0 - 10	3.69	0.17	3.69	0.17	100
11 - 20	9.09	1.48	12.78	1.65	96
21 - 30	12.22	2.99	25.00	4.64	74
31 - 40	10.23	3.49	35.23	8.13	61
41 - 50	12.50	5.36	47.73	13.49	52
51 - 60	9.37	4.90	57.10	18.39	50
61 - 80	8.81	5.85	65.91	24.24	50
81 - 110	6.25	5.31	72.16	29.55	44
111 - 150	8.24	9.78	80.40	39.33	36
151 - 200	5.96	9.99	86.36	49.32	27
201 - 300	5.69	13.65	92.05	62.97	21
301 - 400	4.54	14.91	96.59	77.88	16
401 - 600	2.27	10.62	98.86	88.50	10
600 - over	1.14	11.50	100.00	100.00	6

*Income categories were arbitrarily selected to present the income shares of meaningful percentages of families.

SOURCE: SUDENE/MSU Consumer Survey (1967).

necessary to think in terms of a mass market for basic low cost necessities, both food and non-food, and a restricted market for luxuries. The emphasis of any program to generate scale economies must thereby deal with those goods which have mass potential, i.e., low cost basic food and certain low cost consumer goods.

Food Shopping Preferences and Behavior in Recife

The Relationship between Independent Variables

Before the relevant questions of who spends what, where, and for what reasons can be answered, it is necessary to compare the demographic variables which will be used as independent variables. This analysis shows the relationships between independent variables to be such that when each is used with dependent variables, the analysis of that table is not clouded by the effects of other independent variables. Thus, the relationship between independent variables is stated specifically at the onset. Table 4.3 presents the Pearson product-moment correlation coefficients along with indications of significant linearity and significant chi-square relationships.

Table 4.3 Relationship between Independent Variables Pearson Product-Moment Correlation Coefficients

	Weekly Food Expenditure	Mass Media Exposure	Literacy-Education
Weekly Food Expenditure			
Mass Media Exposure	.47*	--	
Literacy-Education	.48*	.54*	--
Modernity	.07	.18*	.19*

SOURCE: SUDENE/MSU Consumer Survey (1967).

*Both the correlation and chi-square are significant at the .05 confidence level.

The most pervasive predictor of the other independent variables is the literacy-education index. This index is, in essence, the literacy score of the respondent (as tested) if the respondent is not completely functionally literate. This is to say that a

respondent who is partially literate or illiterate could not have had a meaningful educational experience. Thus, only the literacy score should be counted. On the other hand, if the respondent is literate, then years of education are added to the literacy score to get a composite cumulative score of literacy and education. This index significantly related with each independent variable. The higher the literacy and education of the housewife, the greater was her weekly food expenditure, mass media exposure, and modernity. The index was split into terciles with groups representign functional illiteracy, literacy but little formal education and literacy with some formal education.

The mass media exposure of the housewives interviewed was measured by combining responses to questions measuring newspaper and magazine readership, radio use and television use. The housewives' mass media exposure was also related to each of the other independent variables. Mass media exposure (indicated by a high index score) was positively and strongly related both to literacy-education, as noted above, and to weekly food expenditure. It was significantly but not strongly related to modernity. The mass media exposure index scores were split into tercile groups for contingency analysis. The correlation of Rho +.54 between mass media exposure and the literacy-education indicates that there is much in common between these variables. When the contingency tables of each are compared, they both indicate the same relationships in nearly identical ways. The mass media index consistently showed slightly stronger relationships than did the literacy-education index. Thus, rather than report both sets of tables throughout this chapter, only the tables for the literacy-education index will be shown, except where mass media usage has special significance. The conclusions will thus be a somewhat conservative estimate of those resulting from the mass media exposure index.

Housewives were asked to report the amount of money they spent for food in the last week. The weekly food expenditures thus obtained were related to two other independent variables. As has been noted above, the greater the food expenditure, the higher the housewife's literacy, educational level and media exposure score tended to be. This independent variable was split into tercile groups for the analysis. The values for the food expenditure groups are as follows:

NCr$	US$		NCr$	US$
1	(1.00)	to	24	(9.07)
25	(9.08)	to	40	(15.00)
41	(15.01)	to	over	(over)

The modernity index was made up of 12 questions related to the respondents' attitudes and beliefs about the way in which the world operates. Concepts such as trust in others, belief in fate, family ties, felt social sanctions, etc., are included in this index to separate traditional thinkers from the more modern. As has been noted, modernity was positively (though not strongly) related to mass media exposure and literacy-education level.

It should be noted that the independent variables used were selected from a larger list based on three criteria. First, they did predict differences among consumers, i.e., they divided consumers into separate groups. Second, each variable grouped consumers on a different basis. Third, the variables can be manipulated for development programs and thus have relevant implications for the system. Mass media exposure, literacy-education indices and weekly food expenditures are all variables of this type. The second criteria was the least satisfied, as indicated in Table 4.3.

It is useful to briefly explain why several possible important common variables, such as total family income, were not included in the analysis.

The weakness of the income data has already been noted. Weekly food purchase data is not as vague as weekly income to the housewife and therefore tends to be more reliable. The correlation of Rho +.64 between family weekly income and weekly food expenditures indicates that these two variables are closely related. Further, when cross tabulations of the dependent variables with each of the independent variables were compared, there was little difference in the relationships (i.e., the same relationships were indicated by each variable). Hence, little would be gained from reporting both relationships and, logically, the variable with greater reliability should be used. Thus, weekly food expenditure will be used as an indication of income as well as food expenditure.

Age was not a good predictor of the dependent or other independent variables. Thus, contrary to popular belief, the young did not significantly differ from older members of the population. Also, age distribution in the study closely approximates a normal curve so that the argument that housewives did not differ because they were homogeneous in terms of age is without statistical foundation.

Another possible independent variable was geographical location in the city. Like age, this variable did not indicate significant differences between consumers when they were compared with the relevant dependent variables.

For the remainder of this chapter, only relationships between the independent variables and dependent variables where chi-square is significant at the .05 level will be presented.

General Usage of Income

Of the NCr$113 (US$42) mean weekly family income, NCr$60 (US$22) was required per week for food. Thus, the population of Recife tended to spend an average of 53% of their weekly family income on the purchase of food (Table 4.2). The Instituto Joaquim Nabuco de Pesquisas Sociais reported an average of 49.4% spent on food[7] and the Banco do Nordeste do Brasil, S.A. collected consumer consumption data which indicated an average of 54% spent weekly[8] (Table 4.4).

Table 4.4 Percent of Income Spent on Food

Income Level(Cr$)	% of Families	% of Family Income
0 - 3,000	58	70
3,000 - 6,000	24	57
6,000 - 9,000	9	56
9,000 - over	9	37
Mean of all groups	100	54

SOURCE: Fortaleza, Ceará, 1962.

Some answers to the question of how increased income might be spent are clear. There are marked differences between the average propensity of the rich and the poor to consume food. This information, coupled with the data on income distribution, leads to the conclusion that if low cost basic food prices were lowered to the mass poor market, most of the resultant increased expenditure would

[7] *Ibid.*, p. 133.

[8] Banco do Brasil, *op. cit.*, p. 32.

probably be for food. On the other hand, if price changes favored upper income consumers, most of the increased expenditures would be for non-food goods. These remarks deal with extremes, and it would be more accurate to consider price changes affecting all groups of consumers to some degree, combining these effects.

It is important to understand, however, that these reactions to price change do not apply to all consumers. Distinct consumer groups will act in different, but predictable, ways. It can also be noted that if the income of all consumers increases, a smaller percentage of such income would be spent on food. On the other hand, though a smaller percentage of income is spent on food, total income is greater and thus more actual money would be spent on food, i.e., Engel's Law seems to hold.

Of the respondents, 55% reported owning their own home and the mean rent for non-owners was NCr$61 (US$23) per month. It is interesting to note that the median rent was NCr$39 (US$14). Typically, the very poor do not rent, but live in self-built shacks. Seventy-two percent of the respondents' homes were judged to be in clean condition, although no judgment was made as to whether the dwelling was substandard for human habitation. Twenty-three percent of the families were paying at least NCr$10 (US$3.70) per month on a time purchase (not land or housing), with the mean payment being NCr$49 (US$18.15). The average payment for all respondents was NCr$11 (US$4.07) per family per month. Savings over NCr$10 (US$3.70 were reported by only 8% of all respondents, and the mean saved per family was NCr$4.50 (US$1.67) per month.

To clarify these savings figures, it should be noted that savings in an area where inflation is rampant is hard to document because money is typically not held. Because investment opportunities carry large risks and are not open to most investors through an orderly investment market, most savings find their way into durable purchases which hold their value.

Consumers interviewed were asked what one or two things they would do with a sum of money equal to their annual income if they had saved it. Almost half (49%) of the housewives said they would buy a house, 18% would invest the money in business, 12% would buy land, 12% would buy consumer goods and food, and 4% would save the money. Twelve percent listed other uses for the money.

Durable goods were popular and some were widely owned. Seventy-seven percent of the respondents indicated that there was a working radio in their home and 35% claimed to own a television. These figures have implications for the use of mass media in reach-

ing consumers. However, further discussion will be deferred until the later section on mass media usage. Seventy-four percent of the respondents reported ownership of sewing machines, which Brazilian women consider a top priority durable. Only 13% of the housewives indicated that the family owned a car or truck; hence, public transportation must be used for distant purchases. Therefore, the locational convenience of retail outlets is of utmost importance. This fact will be underscored when store use and non-use are analyzed later.

Forty-four percent of the respondents claimed their households had refrigerators. Because refrigerators are so important to family health as well as to the shopping behavior of housewives, a digression will be made at this point to present a more detailed analysis of refrigerator ownership. Table 4.5 presents the basic relationship between refrigerator ownership and user characteristics.

Table 4.5 Independent Characteristics of Housewives Related to Refrigerator Ownership

	Value of Food Purchases Last Week		
	NCr$0-24 (US$0-9.07)	NCr$25-40 (US$9.08-15.00)	NCr$40-over (US$15.01-over)
Refrigerator Ownership	15%	38%	82%
	Level of Literacy-Education		
	Illiterate	Some Literacy-Little Education	Literate Some Education
Refrigerator Ownership	24%	39%	85%

SOURCE: SUDENE/MSU Consumer Survey (1967).

Refrigerator ownership was strongly related to weekly food purchases, since only 15% of the low food purchase category owned refrigerators while 82% of the high purchase consumers had them. Similarly, there were strong positive relationships between refrigerator ownership, mass media exposure and level of literacy-education.

Thus, as expected, poor and uneducated housewives are forced to shop more often than other housewives, tolerate more spoilage,

and do without certain kinds of foods. The shopping behavior of these groups will be discussed in detail later in this chapter.

Shopping Practices

Who Shops - Before embarking on an analysis of shopping behavior, it is necessary to isolate the family shopper and decision-maker. The housewife decided what to buy in 80% of the households responding, with the male family head making the decisions in 18% of the families. The housewife also said she does 69% of the shopping, while the male household head shopped in 25% of the households. Relatives made the decisions in 2% and shopped in 4% of the households. Maids made decisions in almost none and shopped for about 1% of the families. Clearly, the housewife is the important decision-maker, one reason why housewives were interviewed.

Place of Purchase - The next question that arises is where shoppers shop. One approach is to look at simple percentages of shoppers using various types of retail outlets. In the week before the interview, 33% of the shoppers frequented a self-service store, 54% went to a neighborhood store, 25% purchased from a permanent market and 82% bought from a street fair.

The need to define these terms is evident. A self-service store is simply, as its name implies, self-service, and ranges in size from small (40 $m.^2$) to large (1,200 $m.^2$). There are 42 such stores in Recife. A neighborhood store is a permanent, stationary, single retail unit which is not self-service. Thirty-nine percent of these are corner grocery type stores, 51% are wood huts, 4% are specialty stores and 6% are other types. Permanent markets are groups of atomistic retailers located in close proximity. Finally, street fairs are groups of atomistic retailers who operate in one location for one or two days per week.

It is interesting to note in comparison that a 1960 ETENE (BNB) consumer survey showed that 80% of the families interviewed preferred to buy in street fairs; 66% bought in neighborhood stores (other than specialty stores); 34% purchased in public markets (most of the permanent market category); 24% shopped in cooperatives, government stores and some markets in the permanent market category; and 5% shopped in other stores, of which over 3% were specialty stores and less than 2% were vendors selling for home consumption in the streets.[9]

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[9] *Ibid.*, pp. 40-41.

Although category definitions are different, as noted, the kind of change over the 7-year period can be observed. Neighborhood stores and permanent markets have decreased in importance, while the self-service store has largely taken the place of the waning cooperatives and government stores. Since 1960 the number and impact of street vendors has decreased due to competition, political action and changing consumer habits. Street vendors are licensed to sell door to door, but many have set up semi-stationary locations on the streets and sidewalks. The city government tends not to renew the licenses of these semi-stationary vendors, thus reducing the total number.

Further insight into where shopping is done can be gained by studying the differences between the clientele of the various retail outlets. Table 4.6 presents these differences as they relate to weekly food expenditures.

Table 4.6 Percent of Total Weekly Food Purchases Related to Type of Retail Outlet Used

	Value of Food Purchases Last Week		
Shopped During Past Week at:	NCr$0-24 (US$0-9.07)	NCr$25-40 (US$9.08-15.00)	NCr$41-over) (US$15.01-over)
Self-Service Stores	14	27	55
Neighborhood Stores	72	53	34
Permanent Market	15	26	36
Street Fairs	Relationship not statistically significant		

SOURCE: SUDENE/MSU Consumer Survey (1967).

Fifty-five percent of the high food expenditure group interviewed shopped at self-service stores as compared to 14% of the low food expenditure group. Hence, a strong positive relationship existed. The opposite relationship existed for neighborhood stores, which high food spenders did not patronize. Permanent markets seemed to attract a higher percentage of high food spenders, while street fairs attracted customers of all levels of spending.

Finally, it is of interest to view place of food purchase from the standpoint of education (Table 4.7). Of those with some

education, 63% shopped in self-service stores, while only 18% of the illiterate shopped in self-service stores. The reverse was true when neighborhood stores were considered. Sixty-eight percent of the illiterate group shopped in these stores compared to 25% of the literate, educated group. Permanent market shopping was positively related to level of education, while street fair shopping showed no significant relationship to educational level. The same relationships hold for mass media exposure.

Table 4.7 Level of Literacy and Education Related to Type of Retail Outlet

Shopped During the Past Week at:	Level of Literacy and Education		
	Illiterate	Some Literate Little Education	Literate Some Education
Self-Service Stores	18%	26%	63%
Neighborhood Stores	68%	60%	25%
Permanent Market	15%	25%	38%
Street Fairs	Relationship not Statistically Significant		

SOURCE: SUDENE/MSU Consumer Survey (1967).

In conclusion, self-service stores attract customers of higher income, more education, and more exposure to mass media than other retail types. Permanent markets sell to more of these customers than both neighborhood stores and street fairs sell to all levels of customers combined.

Reasons for Shopper Use and Non-Use of Retail Types - The reasons given by respondents for use or non-use of the various types of retail outlets provide insights into both the nature of store use and the conditions under which changes in the retail shopping patterns would occur. Table 4.8 compares the reasons of users and non-users of store types.

The profile of self-service stores emerges clearly from Table 4.8. Low price was cited by 63% of the users, convenient location by 36%, variety by 31% and quality by 24% as the major reasons for self-service store use. Seventy-eight percent of

Table 4.8 Reasons for Use or Non-Use of Store Types by Store Type, Users and Non-Users

Reasons for Use or Non-Use by respondents who were users or non-users	Self-Service[a] Stores		Neighborhood[a] Stores		Permanent[a] Markets		Street[a] Fairs	
	% of Users	% of Non-Users	% of Users	% of Non-Users	% of Users	% of Non-Users	% of Users	% of Non-Users
Convenient Location	36	78	81	23	28	58	30	52
Quality	24	4	3	18	36	4	37	11
Cleanliness	13	0	1	10	2	7	1	11
Credit	0	8	23	2	2	9	0	11
Delivery	3	0	0	0	0	0	0	0
Variety	31	1	5	15	35	7	42	5
Price	63	11	14	48	36	18	43	19
Service	12	12	9	26	6	24	4	15
Other	1	5	0	7	2	4	2	19

[a]All housewives were divided into a users group and a non-users group for each of the retail types. These sub-groups form the population for each column. More than one answer was given as to the reasons for using or not using the stores.

SOURCE: SUDENE/MSU Consumer Survey (1967).

non-users reported locational inconvenience as the major factor for non-use. There were few other objections to self-service store use.

As expected, convenient location was cited by most neighborhood store users as the major reason for use, while 23% were tied to this type of store by credit. In contrast to the self-service stores, price was viewed by 48% of the neighborhood store non-users as the major reason for their non-use. Poor service, inconvenience and poor quality were also seen as reasons for non-use.

Permanent market shoppers felt that these markets combined quality (36% of users), low prices (36% of users), wide variety (35% of users) and, for some (28% of users), locational convenience. Non-users saw locational inconvenience (58% of non-users), poor service (24% of non-users) and high prices (18% of non-users) as reasons for shopping elsewhere.

Finally, street fair users viewed price consideration as most important (43% of users) with variety very important (42% of users), quality important (37% of users) and locational convenience significant (30% of users). On the other hand, 52% of non-users found street fairs locationally inconvenient, 19% felt prices were high and 15% reported poor service.

Two factors stand out as relatively important. First, locational convenience is of utmost importance to the consumer and second, price plays an important role in determining where consumers shop, given locational access to various alternatives. The reasons given for use or non-use of various retail outlets reflect consumer perceptions of these outlets. Consequently, they are essential to an understanding of the shopping process and the changes which would occur if the retail structure were to change.

Before leaving consumer perceptions of retail types, it is of interest to note that, except for the self-service category, many housewives felt that retailers cheated them on weights. Twenty-four percent of street fair shoppers suspected cheating, 23% of neighborhood store users thought there was cheating, 17% of permanent market customers agreed and only 4% of self-service customers perceived cheating.

In conclusion, analysis of consumer use of self-service stores, reasons for use, reasons for non-use and perceptions of cheating have brought to light the surprising realization that the change from street fair to self-service shopping which has occurred over the past seven years has wide consumer support rather than the traditional resistance which might be expected. This is not to say

that self-service stores have or will jump to a commanding share of the food market, but a significant change has occurred which consumers seem to accept. On the other hand, street fairs remain a widely-used retail outlet, especially for fruits and vegetables.

Food Expenditure Patterns - To understand consumer buying behavior, it is important to know how much is spent at various retail outlets and the frequency of purchase at each. Table 4.9 presents these expenditure pattern statistics.

Table 4.9 Weekly Food Expenditures, Frequency of Purchase, and Per Trip Expenditures by Type of Retail Outlet

Type of Retail Outlet	Mean Total Food Purchase Per Week		Mean Trips Per Week	Mean Purchase Per Trip	
	NCr$	US$	Number	NCr$	US$
Self-Service Store	33.45	12.39	1.2	27.87	10.32
Neighborhood Store	18.83	6.97	3.9	4.83	1.79
Permanent Market	18.71	6.93	1.5	12.47	3.62
Street Fair	21.55	7.98	1.1	19.59	7.26

SOURCE: SUDENE/MSU Consumer Survey (1967).

Those who used self-service stores spent an average of over NCr$32.40 (US$12) per week for food in these stores, while street fair shoppers spent NCr$21.60 (US$8) per week in fairs. Neighborhood store and permanent market shoppers spent about NCr$18.90 (US$7) per week in each of these outlets.

The number of trips consumers made to various retail outlets revealed much about the functions of these outlets (Table 4.9). Respondents who shopped at self-service stores, street fairs, and permanent markets generally shopped once a week. Neighborhood store shoppers shopped an average of four times a week. It is interesting to note that 25% of these neighborhood store shoppers shopped once a day or more frequently.

The mean purchase per trip indicates the kind of scale that a retail outlet can acquire per customer and thus relates to the transaction efficiency attainable. Table 4.9 clearly shows that the largest mean per trip purchase is made at self-service stores.

It should be remembered that permanent markets and street fairs are made up of many atomistic retailers and thus the size of an individual transaction may be significantly smaller than the table suggests.

In summary, when frequency of purchase information is coupled with the reasons for store type use, the conclusion that the major function of the neighborhood store is locational convenience for frequent small purchases emerges. On the other hand, other retail outlets provide a source for larger weekly purchases.

Although no data is available, it seems plausible that the traditional street fair may be responsible to some degree for the ease of acceptance of the self-service stores. Because the street fairs are typically two days in length and recur weekly, the consumer is conditioned to buying a good portion of her purchases on a weekly basis. Thus, when self-service stores developed, the shopper easily adjusted buying to the scale required for success of the new retail method.

Products Purchased - The functions performed by the several types of retailers become clearer when product purchases are analyzed (Table 4.10). The customers were asked what products they purchased most often at each type of outlet, with three responses being recorded. Self-service store customers use those outlets for staple purchases. Of these consumers, 91% bought cereals (rice, beans, manioc flour), 66% purchased canned foods and 59% bought dairy products. Neighborhood store customers purchased cereals (62% of customers), dairy products (41% of customers) and canned foods (22% of customers). Fruits, vegetables and fresh meat were bought by about half of the permanent market shoppers; approximately 3/4 of the street fair shoppers bought fruits and vegetables; and over 4/10 of the street fair customers purchased fresh meat and cereals.

In conclusion, it can be said that most consumers buy perishable foods from retailers in the permanent market and street fair groups, while they purchase their non-perishable staples from the individually located neighborhood and self-service stores. Thus, small market retailers must take the risk associated with highly perishable foods, while the large individual proprietors deal with low spoilage, low risk items.

Use of Retail Services - Table 4.11 presents the percentage of consumers using delivery and credit services from the basic retail types. Consumers clearly carry home most of their purchases,

Table 4.10 Products Purchased by Customers of Various Retail Types for Home Consumption (First three Items Mentioned)

Product Type	Self-Service Stores, % of Customers	Neighborhood Stores, % of Customers	Permanent Markets, % of Customers	Street Fairs % of Customers
Rice, beans, manioc flour	19	62	23	43
Fresh meat	2	2	52	44
Fruits	2	12	57	80
Vegetables	5	9	44	74
Dairy products	59	41	10	5
Canned foods	66	22	6	2
Non-food products	27	16	3	2
Other	16	54	22	13

SOURCE: SUDENE/MSU Consumer Survey (1967).

although self-service and neighborhood stores do deliver for 10% and 9% of their customers, respectively. Only neighborhood stores extend credit to a significant portion (25%) of their customers. This function explains the hold that these stores have on the customer. Thus, a second dimension is added to the locational advantage of the neighborhood store.

Table 4.11 Percent of Customers that Use Delivery and Credit by Retail Type

Service	Self-Service Store	Neighborhood Store	Permanent Market	Street Fair
Delivery	10	9	5	4
Credit	6	25	1	1

SOURCE: SUDENE/MSU Consumer Survey (1967).

Self-Service Store Location - Before leaving the analysis of shopping behavior by store type, it is useful to digress on how consumers get to and return from the self-service store that they use. In terms of distance, 11% of self-service store customers estimate that there was a store within 1/2 kilometer but more than one block away, 20% said there was a store between 1/2 and 1 kilometer away, 11% reported a store located between 1 and 2 kilometers and 38% estimated the nearest self-service store was over 2 kilometers away. To travel to and from these stores, 41% of the housewives interviewed walked, 27% drove in a private car, 22% rode the bus, 6% took taxis and 4% traveled to the store by one means and returned by another. It was noted earlier that 13% of the respondents claimed car ownership. Evidently many ride with their friends to the store. Again, the importance of locational convenience is pointed up by this data.

Consumption of Selected Commodities - Though this research effort did not include mapping of commodities consumed, it is interesting to look at the consumption of selected commodities to see the differences existing between income levels. The data for this analysis were collected in 1960 by the Banco do Nordeste do

Brasil, S.A.[10] Table 4.12 presents the consumption differences for selected commodities. Because the BNB study made their first income split at 59% of the population, it was not possible to report a finer breakdown by income. Even so, consumption differences between the two income groups is marked. Lower income consumers purchase more manioc flour and beans relative to their incomes than the higher income group. High protein foods such as fresh beef, fresh milk, eggs and poultry make up a greater proportion of the consumption of the higher income group compared to lower income consumers. Not only do poorer consumers eat less (except for manioc flour), but they eat much larger proportions of low nutrition foods than higher income consumers.

The Search Process - Where consumers buy, what they buy, how much they spend and the reasons they use various retail types have been considered to this point. Further insight into the buying process can be gained by considering the elements which consciously or unconsciously affect the consumer in her search for a retail outlet.

Seventy percent of the housewives interviewed reported they always purchased from the same group of stores or the same geographic location. This does not imply that a search process does not occur within the group of stores used (operators within a street fair) or as conditions change, but indicates that there is not a major week-to-week search for lower prices, better food quality, or other conditions at new locations.

Price and Quality Considerations - Before looking at the search process itself, it is worthwhile to consider what the consumer looks for and what knowledge the consumer feels that she is working from.

The consumer saw quality as important, along with price, and seemed to think that she could judge quality. When asked if they bought for low prices regardless of quality, only 30% said yes. When asked if their neighbors considered quality more important than price, 55% responded yes, 17% said no and 27% did not speculate. Of the respondents, 58% claimed to know the general price levels of food in stores where they did not shop and 73% bargained on price. It should be noted that bargaining does not take place in most self-service stores since prices are posted. In terms of quality, 84% of the consumers tried to buy the same quality each

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[10] *Ibid.*, p. 37.

Table 4.12 Consumption of Selected Commodities by Income Level of Consumers

Commodity	Units	Lower Income 58% of Families Consumption Per Year	Upper Income 42% of Families Consumption Per Year	Difference	% Greater Consumption by Upper Income
Manioc Flour	kg.	30.6	20.9	-9.7	-32
Beans	kg.	17.2	18.4	+1.2	+7
Tomatoes	kg.	10.3	13.7	+3.4	+33
Bananas	units	295.4	453.7	+158.3	+54
Rice	kg.	13.3	20.6	+7.3	+55
Fresh Beef	kg.	19.4	39.2	+19.8	+102
Fresh Milk	kg.	12.0	27.3	+15.3	+128
Eggs	units	44.9	110.4	+65.5	+146
Poultry	kg.	2.1	5.6	+3.5	+167

SOURCE: Brazil, Banco do Nordeste do Brasil, S.A., *Abastecimento de Gêneros Alimentícios da Cidade do Recife* (Fortaleza, Ceará: ETENE, Banco do Nordeste do Brasil, S.A., 1962), p. 37.

week, 65% felt that their neighbors knew how to evaluate quality and 58% speculated that their neighbors knew the quality offered by various retailers.

Table 4.13 presents the relationships between the value of weekly family food purchases and several price and quality considerations. The greater the family food purchases, the smaller was the percentage of consumers that bought for low price only. The larger the weekly food purchases, the more the consumers knew the prices of food in other stores. The smaller the weekly food purchase, the greater was the tendency to bargain with the retailer over price (this relationship was not significant where income was the control variable). Finally, there was no significant difference between small and large volume purchasers in terms of quality.

Table 4.13 Weekly Food Purchases Related to Price and Quality Considerations

	Value of Food Purchases Last Week		
Housewives Who:	NCr$0-24 (US$0-9.07)	NCr$25-40 (US$9.08-15.00)	NCr$41-over (US$15.01-over)
Buy low price, not quality	49%	37%	13%
Believe neighbor thinks quality more important than price	48%	52%	71%
Know prices in other stores	47%	58%	70%
Bargain for lower prices	82%	75%	64%
Always buy same quality	Relationship not statistically significant		
Believe neighbor can evaluate quality	Relationship not statistically significant		
Believe neighbor knows quality sold by retailers	Relationship not statistically significant		

SOURCE: SUDENE/MSU Consumer Survey (1967).

One way consumers searched was via the mass media (newspaper, radio and TV advertising). Thus, it is of interest to relate mass media exposure to the several price and quality considerations

(Table 2.14). High exposure customers tended to feel that quality was more important than price, and tended to bargain less than those with low exposure. However, statistically significant relationships were not found for quality considerations.

Table 4.14 Percent Mass Media Exposure Related to Price and Quality Considerations

Housewives Who:	Score on Mass Media Exposure Index		
	Low	Medium	High
Buy low price, not quality	51	35	14
Believe neighbor thinks quality is more important than price	49	53	63
Know prices in other stores	Relationship not statistically significant		
Bargain for lower prices	76	79	65
Always buy same quality	Relationship not statistically significant		
Believe neighbor can evaluate quality	66	67	61
Believe neighbor knows quality sold by retailers	Relationship not statistically significant		

SOURCE: SUDENE/MSU Consumer Survey (1967).

How consumers felt about the price-quality decision was reflected by time of shopping in street fairs. At the beginning of a street fair, prices are high since quality is at its best and merchants are optimistic that they can sell a lot at high prices. After one or two days, quality drops due to spoilage and consumer selection, and merchants try to recover as much of their costs as possible by selling at reduced prices. Of the housewives who shopped in street fairs, 56% shopped early, reflecting a concern for quality; 27% shopped at no special time and 17% shopped at the end of the fair, indicating price orientation.

Table 4.15 shows that the higher the weekly food expenditure the greater is the likelihood that the purchaser will shop early in the fair. The lower the weekly food expenditure, the greater the chance that the consumer will purchase at no special time. The low and middle food expenditure groups tended to buy more often

at the end of the fair than did the high expenditure group. Table 4.16 demonstrates the same relationships relative to the level of literacy-education and mass media exposure of the respondents.

Table 4.15 Weekly Food Expenditure Related to Time of Purchase in Street Fair

Housewives Who Shop at the:	Value of Food Purchases Last Week		
	NCr$0-24 (US$0-9.07)	NCr$25-40 (US$9.08-15.00)	NCr$41-over (US$15.01-over)
Beginning of fair	45%	49%	77%
No special time	38%	27%	14%
End of fair	17%	24%	9%

SOURCE: SUDENE/MSU Consumer Survey (1967).

In summary, it was generally agreed by the various consumers that quality judgments could be made by most shoppers. However, those with large weekly purchases and high mass media exposure placed more emphasis on high quality relative to price and knew alternative prices when shopping. Low value purchasers bargained more often. Hence, with the exception of bargaining, the upper income and more affluent mass media users claimed better price knowledge and strove for good quality and price when they bought.

Table 4.16 Level of Literacy and Education Related to Time of Purchase in the Street Fair

Housewives Who Shop at the:	Level of Literacy-Education		
	Low	Medium	High
Beginning of fair	46%	58%	67%
No special time	37%	23%	18%
End of fair	17%	19%	15%

SOURCE: SUDENE/MSU Consumer Survey (1967).

Consumer Information Usage

It was pointed out that 57% of the housewives said that they knew the price levels of food at other stores. Fifty-eight percent claimed they tried to get information from more than one businessman before they bought. When asked if they thought their neighbors needed more information on prices and quality, 49% responded yes, 25% said no and 26% said that they did not know. Of the respondents, 37% claimed they read food advertisements in the newspaper and 40% felt that advertisements (any media) influenced their choice of place of purchase.

On the surface, this information seems to contradict the data presented earlier on the steady use of retailers. However, these responses are not oriented to a time period. A respondent can periodically change her regular place of purchase, can search for new or better places to purchase while still purchasing at a regular place, or can search within what she considers her regular group of retail outlets. Further, these questions lend themselves to a positive response, as the housewife does not want to feel or admit that she is not a good homemaker. Hence, the percentages reflect the housewives' recognition of appropriate behavior as well as their actual behavior.

There is an important link between mass media exposure and information used by consumers. Table 4.17 shows that those with more mass media exposure read more ads in the newspapers and are influenced more by retail food advertising. Thus, there is an indication that consumer behavior can be influenced through advertising, with implications for change which are interesting to both public and private sectors.

Table 4.17 Relationship of Mass Media Exposure to Advertising Influence

Housewives Who Reported:	Score on Mass Media Exposure		
	Low	Medium	High
Reading food ads in newspapers	17%	37%	64%
Ads of all media influencing their location of purchase	31%	38%	51%

SOURCE: SUDENE/MSU Consumer Survey (1967).

The relative importance of various price information sources can be judged from the responses of consumers when asked to indicate two sources of information for them. Seventy-one percent of the consumers obtained price information from retail stores, 19% from friends and neighbors, 22% from the broadcast media and 12% from newspapers. The role of the mass media, though small, does show consumer awareness of advertising and some consumers reported they were influenced by advertising.

Mass Media Usage

The above notion of the importance of mass media exposure and influence suggests that further analysis of mass media usage should be made. An understanding of which consumers can be reached through various media would allow the more efficient use of mass media for stimulation of change or acceptance of change at the retail level.

Of the housewives who responded, 44% reported that they received magazines and/or newspapers regularly, and 58% claimed that someone in the household had read a magazine or newspaper lately. On the other hand, 16% of the housewives reported listening to the radio rarely, 41% said they listened sometimes, and 43% reported listening at least one hour per day. Of the respondents, 34% never watched television, 32% reported watching television sometimes, and 34% indicated that they watched it regularly. It is interesting to note that the high food purchase-literate respondent group watched television at home while the lower food purchase-illiterate respondents typically watched television outside the home.

The type of audience attracted by the various media gives an indication of which media can be used to reach different kinds of consumers. Tables 4.18 and 4.19 show that high value food purchase-literate respondents tend to read the printed media substantially more than do low value food purchase-illiterate respondents. Concerning radio, there is no indication that high value food purchase-literate respondents have appreciably higher listenership than do others. Finally, high value food purchase-literate respondents have heavy television usage while other groups do not on a regular, at-home basis.

The conclusion can be drawn that upper income educated consumers are more effectively reached through the printed media and television than lower income uneducated consumers, while all consumer levels are equally exposed to radio.

Table 4.18 Weekly Food Purchases Related to Mass Media Usage

Housewives Who:	Value of Food Purchases Last Week: NCr$0-24 (US$0-9.07)	NCr$25-40 (US$9.08-15.00)	NCr$41-over (US$15.01-over)
Read magazine or newspapers lately	41%	55%	81%
Do not listen to radio	27%	6%	19%
Listen some to radio	36%	42%	48%
Listen regularly to radio	37%	52%	33%
Do not watch television	48%	39%	16%
Watch television some	45%	36%	11%
Watch television regularly	7%	25%	73%

SOURCE: SUDENE/MSU Consumer Survey (1967).

Table 4.19 Level of Literacy and Education Related to Mass Media Usage

Housewives Who:	Score on Literacy-Education Index: Illiterate	Some Literacy Little Education	Literate Some Education
Read magazine or newspaper lately	31%	64%	88%
Do not listen to radio	23%	10%	19%
Listen some to radio	38%	43%	49%
Listen regularly to radio	39%	47%	32%
Do not watch television	50%	36%	7%
Watch television some	39%	32%	21%
Watch television regularly	11%	32%	72%

SOURCE: SUDENE/MSU Consumer Survey (1967).

Summary

The housewives made most shopping decisions and did most of the shopping as well. Of the respondents, 82% frequented street

fairs, 54% went to neighborhood stores, 33% used self-service stores and 25% purchased from permanent markets in the week before the interview. Consumers with higher incomes and/or more education tended to frequent self-service stores more often than lower income, less educated consumers. Consumers reported locational convenience as the most important reason for store use or non-use. In addition, low prices were emphasized by self-service shoppers while low price, quality and variety were cited as important by street fair users. Market retailers typically carried fruits and vegetables, whereas the neighborhood and self-service stores did not. The greatest individual transactions occurred at the self-service stores, while neighborhood stores were characterized by frequent transactions of the smallest size. Twenty-five percent of the neighborhood store shoppers reported they bought on credit. Few respondents used credit at the other types of retailers.

Generally, the higher income, more educated consumers reported they had more price information, claimed that they searched more before buying, and said they wanted higher quality than did the lower income, less educated consumers. The higher income, more educated respondents had greater mass media exposure, particularly to printed media and television, and felt more advertising influence than did the lower income, less educated consumers.

Attitudes toward Modernization

The willingness of certain consumers to adjust to a changing retail structure is evidenced by the increased use of the self-service stores. However, in spite of this willingness, there is a lack of large, high volume, low margin self-service stores. Other indicators of consumer changeability--their innovativeness and their belief and attitudinal predispositions--may shed some light on this apparent contradiction.

Consumer Innovativeness

Four questions were asked to indicate how innovative the housewives were. Almost half (49%) said that they preferred prepackaged goods and 72% said self-service was better than being waited on. Forty-two percent claimed they tried new products which appeared on the market, while only 26% felt that their friends thought of them as innovators. Again, support for the self-service concept was expressed, and almost half of the housewives had accept-

ed the idea of pre-packaging--a necessary element in the increase of retail scale.

Responses to the questions concerning product testing, the desirability of self-service, and innovativeness were grouped together into an index of consumer innovativeness to give a more general indication of willingness to change. Table 4.20 shows that the large weekly food purchasers tended to be more innovative than small weekly food purchasers. Table 4.21 indicates that the literate-educated housewives were more innovative than illiterate ones. Housewives with high mass media exposure were also more innovative than those with low exposure.

Table 4.20 Weekly Food Purchase Related to Consumer Innovativeness

	Value of Food Purchases Last Week		
Housewives Who:	NCr$0-24 (US$0-9.07)	NCr$25-40 (US$9.08-15.00)	NCr$41-over (US$15.01-over)
have low innovative index scores	29%	15%	5%
have medium innovative index scores	46%	44%	34%
have high innovative index scores	25%	41%	61%

SOURCE: SUDENE/MSU Consumer Survey (1967).

Table 4.21 Level of Literacy-Education Related to Consumer Innovativeness

	Level of Literacy-Education		
Housewives Who:	Illiterate	Some Literacy Little Education	Literate Some Education
have low innovative index scores	26%	16%	6%
have medium innovative index scores	49%	42%	29%
have high innovative index scores	25%	42%	65%

SOURCE: SUDENE/MSU Consumer Survey (1967).

The conclusion can be drawn from the foregoing analysis that a substantial portion of consumers can and will change their buying habits to new retail outlets, and that higher income, more educated customers will adjust more readily than the poor and uneducated.

Attitudinal Predispositions of Consumer Behavior

A second indicator of basic consumer predispositions to accept or resist change lies in the basic beliefs and attitudes concerning interpersonal trust, fate or luck, family ties, etc. For example, do they believe that they can control their future or that it is controlled by fate, and can they trust others or not?

Interpersonal Trust - Three questions of differing intensity gave some clue to the interpersonal trust that consumers have of others. Of the respondents, 68% felt that one could lose a great deal of money by trusting others, 65% thought that one could not trust one's friends as much as one's family, and 22% felt that one should not join in partnerships with non-family members. There was clearly a suspicion of non-family members but it does not seem so strong as to prevent all cooperation with others.

It is useful to note that when these three questions are combined into an interpersonal trust index it does not relate significantly to the value of weekly food purchases but it is positively related to mass media exposure (see Tables 4.22 and 4.23). The mass media exposure relationships with consumer attitudes differ from those with the literacy-education index.

The relationship between trust and level of literacy-education is not linear, with the somewhat literate middle housewife group exhibiting the most trust of others (Table 4.24). Thus, degree of trust was about the same for all income levels with slight differences accruing from mass media exposure and education.

Familism - The importance of the family is demonstrated by the fact that 72% of the housewives said that a job near the family which paid less was better than a distant job which paid more. A note of caution in interpretation should be made. The intent of this question was to see to what extent the immediate family was mobile relative to the traditional family and social structure. However, some housewives may have understood the question as asking if they approved of their husband taking a job away from them and their children. Of the respondents, 80% felt that a small family

Table 4.22 Weekly Food Expenditure Related to Consumer Attitudes

Housewives Who Hold Various Attitudes:	Weekly Food Expenditure NCr$0-24 (US$0-9.07)	NCr$25-40 (US$9.08-15.00)	NCr$41-over (US$15.01-over)
Interpersonal trust of others	Relationship not statistically significant		
Belief in Fatalism			
High Belief	34%	37%	26%
Medium Belief	32%	19%	15%
Low Belief	34%	44%	59%
Risk (% who played game)	Relationship not statistically significant		
Felt social sanction of innovation	Relationship not statistically significant		

SOURCE: SUDENE/MSU Consumer Survey (1967).

Table 4.23 Mass Media Exposure Related to Consumer Attitudes

Housewives Who Hold Various Attitudes	Score on Mass Media Exposure Index Low	Medium	High
Interpersonal trust of others			
Low Trust	30%	16%	15%
Medium Trust	44%	48%	45%
High Trust	26%	36%	40%
Belief in Fatalism			
High Belief	42%	34%	27%
Medium Belief	26%	25%	17%
Low Belief	32%	41%	56%
Risk (% who played game)	23%	26%	45%
Felt social sanction of innovation	Relationship not statistically significant		

SOURCE: SUDENE/MSU Consumer Survey (1967).

was preferable to a large one. Thus, housewives in general seem to have ties to the family structure and feel a pressure for smaller families.

Table 4.24 Level of Literacy-Education Related to Consumer Attitudes

Housewives Who Hold Various Attitudes:	Level of Literacy-Education: Illiterate	Some Literacy Little Education	Literate Some Education
Interpersonal trust of others			
High Trust	27%	11%	20%
Medium Trust	43%	49%	45%
Low Trust	30%	40%	35%
Belief in fatalism			
High Belief	37%	36%	21%
Medium Belief	28%	24%	13%
Low Belief	35%	40%	66%
Risk (% who played game)	24%	32%	41%
Felt social sanction of innovation	Relationship not statistically significant		

SOURCE: SUDENE/MSU Consumer Survey (1967).

Fatalism - The degree to which consumers believe they are controlled by fate rather than masters of their future has important implications for willingness to change from the traditional buying habits and patterns as the retail structure changes. Table 4.25 presents four indications of fatalism.

Clearly there is a large portion of housewives who feel ruled by fate; however, there is also a surprisingly large group of housewives who seem to believe that they have some control of their future. Logically, those who feel unrestricted by fate would be expected to search more for better ways to satisfy their needs and would be expected to change buying habits sooner than more fatalistic consumers.

Unlike familism, fatalistic views differ somewhat between consumer sub-groups (Tables 4.22-4.24). The greater the weekly food purchase, the greater their mass media exposure, the more literate and educated they are, the greater is the percentage of

consumers who do not believe in fate. Thus, a large group of consumers do not have a fatalistic predisposition, and the higher socio-economic level consumers feel freer from fate than do the lower socio-economic levels. Thus, though the foregoing relationship is not strong, there is an indication that the higher income, more educated consumers would adjust to changes of retail structure and practices more readily than the less well-off consumers, and they already have shifted to some extent.

Table 4.25 Fatalism of Consumer

Housewives Who Feel:	Agree (Fatalism)	Don't Know	Disagree (Non-Fatalistic)
It is better to live for today because tomorrow will take care of itself	59%	8%	33%
Nowadays people alone can't do much to improve living conditions	42%	10%	48%
It is better to leave things as they are to see how they turn out	35%	9%	56%
We would be in a better situation if technicians left things as they are	17%	19%	64%

SOURCE: SUDENE/MSU Consumer Survey (1967).

Risk - Consumers were asked to play a hypothetical game which involved an outlay of NCr$5 (US$1.85) in which there was a chance to win substantial sums. If they chose to play the game, they could then choose a 75% chance to win NCr$50 (US$18.50) or a 50% chance to win NCr$200 (US$74.07) or a 25% chance to win NCr$500 (US$185.00). It is interesting to note that only 31% of the respondents chose to play the game at all. It must be realized that to many low income respondents NCr$5 is a relatively large sum. Income was not as much a factor as might be expected, though, because the low weekly food expenditure group did not significantly differ from the other groups in the percentage who played the game. High mass media usage and high literacy-education level groups did have significantly higher percentages of game players (Tables 4.23 and 4.24). It should be noted that some of the less educated may not have understood the game clearly.

Thus the tendency to take risks is not spread evenly over all consumers, but, again, the indication is that consumers with higher education and mass media exposure would tend to adjust their buying habits to new retail methods more readily.

Social Sanction of Innovation - Finally, when asked if they felt that their neighbors would not like seeing them get ahead in life, 34% of the housewives said yes, 49% said they did not know and 17% said that their neighbors would approve. Thus there is some evidence of social pressure to maintain the status quo. Housewives of all income, education and media exposure levels were relatively homogeneous in their feelings of social pressure. No group stood out from the rest with significantly higher or lower percentages of respondents who felt social sanctions.

Conclusions - In terms of the attitudes of the housewives, there is evidence that some differences between income and education groups exist, particularly concerning belief in fate. The important conclusion is that all consumers do not feel as bound by tradition as might have been expected. Certainly there is a large group which could form the lead edge allowing the change, whatever it might be, to be tested by consumers. Then, if the change fits the consumers' needs and desires, it will gain wider acceptance.

Traditional and Modern Behavior

The modernity index is a measure of predisposition which incorporates most of the above measures. The possible scores range from traditional (12) to modern (36). The distribution of scores is almost perfectly normal and centered in the middle of the range. The mean is 23.9, with 70% of the respondents within plus or minus one standard deviation, and 96% of the respondents within plus or minus two standard deviations.

There are some conclusions that can be drawn about the more modern group of housewives (Table 4.26). The more modern housewives tend to own refrigerators, always shop in the same group of stores, know prices in other stores and prefer pre-packaged goods. Greater percentages of them shop in permanent markets and smaller percentages in neighborhood stores. Again, the various modernity groups shop in about the same proportions in self-service stores and street fairs. A greater percentage of the modern group get information before buying, watch television regularly, read food advertisements, take advantage of specials in stores and are influenced by advertising.

Table 4.26 A Profile of Modern and Traditional Housewives

Housewives Who:	Score on Modernity Index		
	Low	Medium	High
own refrigerators	41%	39%	56%
buy in the same stores	60%	74%	77%
claim to know prices in other stores	50%	56%	69%
prefer pre-packaged goods	40%	58%	51%
purchase in self-service stores	Relationship not statistically significant		
purchase in neighborhood stores	65%	53%	44%
purchase in permanent markets	19%	23%	34%
purchase in street fairs	Relationship not statistically significant		
watch television regularly	31%	28%	46%
acquire information before purchasing	45%	58%	69%
read food ads	33%	43%	58%
take advantage of specials	46%	58%	65%
influenced by advertising a little	31%	25%	17%
influenced by advertising some	37%	33%	27%
influenced by advertising a lot	32%	42%	56%

SOURCE: SUDENE/MSU Consumer Survey (1967).

Summary

The results of the consumer study confirm that incomes are low, median per capita income US$160 per year, and that there is a large discrepancy between the few rich (14% earn over half of the income) and the many poor. Further, only a small percentage of the consumers are educated. The median year of education is three, and many are illiterate. On the average, the consumers spend 53% of their income on food, yet many own their homes and durable goods. Few, however, own cars.

The shopping preferences of consumers suggest that they are acutely aware of the differences in the various types of outlets and that, given greater availability, large self-service stores could gain customers. The popularity of the street fairs implies that customers would not easily be switched from that pattern of shopping, however. Besides an outlet's location, quality, price, and products handled are important factors. Street fairs specialize in fresh, perishable products.

The mass media reach most consumers, though not consistently, and seem to have some influence on purchase behavior. This fact indicates potential use of mass media for increasing consumer

awareness of and changing attitudes toward products and outlets. This information can be an important force for the good of consumers, informing them of nutritional qualities of the products they buy and of the savings available from more selective shopping.

To summarize, it is useful to return to the initial questions raised at the opening of the chapter. The first concerned the use of increased income. The average propensity to consume food was presented for a wide range of income levels, and the distribution of income was emphasized to show the relative size of various market segments. Combining these factors gives a picture of the kind of purchasing response that would result from changes in income at the various income levels.

On the other hand, savings were not adequately indentified. Only the grossest estimates are warranted from the data obtained, and further research is needed to make good estimates of savings at the various income levels.

Inflation makes the holding of cash within the country a poor savings method, and thus excess cash is used to buy durable consumer goods which hold their value as well as give service.

The second question concerned the adaptability of the consumer to changing food market structures and practices. Changes in the past seven years, coupled with the basic consumer outlook toward change, indicate there is a significant portion of the consumer population who will accept new ideas and adapt to changing retail food conditions. Those consumers willing to change tended to have higher incomes and more education, but many low income, uneducated consumers were also willing to change. Again, it must be emphasized that many consumers remain suspicious of change, but consumer predisposition does not seem negative. Of course, consumer reaction to change depends on the nature of the changes and how well they fit the consumers' needs and desires. Any change must be evaluated for consumer approval before a real assessment as to success can be made.

Though it seems that many consumers would change their buying habits to increase their satisfaction levels, given that a way to increase satisfaction exists, there are many who do not exhibit this willingness to change. Further, evidence has been presented that indicates the poorer, less educated consumers have higher representation in the group which resists change. Thus, there is an indication that there are many consumers who could be helped through a consumer education program. This program could

help the poorer consumer use her limited income to better feed her family and thus raise the real income of those helped in terms of volume of food and nutritional value.

CHAPTER 5

THE URBAN FOOD MARKETING SYSTEM

Introduction

This chapter presents some of the findings of a survey of 891 food retailers and 136 food wholesalers located in Recife and the findings of several related non-survey studies (see Appendix A for sample design). These findings will be used to describe the urban food distribution system and to analyze some of the factors which inhibit the various types of businesses from making a larger contribution to regional development. It is intended that this chapter form a base from which possible changes in the system can be analyzed.

Before moving into the data, it is useful to review the kinds of questions which are relevant to internal market integration. The first group of questions deals with the idea that market risks and uncertainties impede production responses so that efficient scale of operation and factor use are not reached. This idea applies not only to farm production, but to each level of the distribution channel as well. The fact that channel members deal with other small, inefficient channel members adds one kind of marketing risk and uncertainty. For example, a trucker may arrive late due to poor equipment, causing spoilage and uncertain supply for a wholesaler. How important are the questions of supply and demand? What other risks and uncertainties are inherent in the marketing systems in which channel members exist? This chapter will deal with these questions at the urban distribution level.

A second question logically follows the first. If marketing variables impede more efficient distribution, then what are the factors which maintain the system? That is, what is the mechanism which prevents the marketing system from weeding out the distortions and preventing change? Again this question will be attacked from the points of view of the retailer and the wholesaler.

Finally, the question that flows directly from the above question is, how can the factors that cause market risk and uncertainties be reduced? What reforms are needed and how should they be implemented? The answer to this question is open to a

certain amount of speculation. The recommendations implied from this work are presented in Chapter 6.

With the above questions in mind as guides, the description of the urban distribution structure of Recife can take on meaning. The retail system will be presented first, followed by an analysis of the wholesaling system. Because of the wide variety of institutional types, it is first necessary to make some brief comments about each type and then, on a comparative basis, present their physical characteristics, decision rules and practices, performance differences, perceptions of the factors limiting their market participation, and personal internal constraints and predispositions. This progression of analyses will lead to an understanding of what the distribution system is, what limitations affect various institutional types, and which institutional types are amenable to change or encouragement.

Retail Distribution

Types of Retail Outlets

Cities within developing regions often have retailing systems dominated by small retailers who perform a locational function, allowing consumers to purchase small quantities near their homes, frequently on credit. The consumer analysis of the last chapter shows that for Recife this traditional concept of a retailing system is only partially accurate. In fact, the retail structure of Recife is a mixture of the old and the new, with the new struggling to overcome the old. This chapter presents the state of the struggle and the potential implications. However, before analysis can be made, it is necessary to introduce the various kinds of retail outlets and describe the surveys used to monitor them.

The following is a list of the major types of retailers in Recife as of the date of this survey:

1. Street fairs
2. Fixed fairs or continuous fair operations
3. Public markets
4. Neighborhood stores
5. Self-service stores
6. Six largest retailers
7. Others

Street Fairs

Street fairs are defined as open-air, non-continuous (non-daily) markets made up of small private businesses selling only one class of product. There are 26 street fairs serving Recife. Usually street fairs operate two days per week, but some operate only one day per week. The owners or managers of these units are called *feirantes*. According to a census by the SUDENE/MSU research team in April 1967 in preparation for the survey of *feirantes*, the number of *feirantes* in each street fair varied from 22 in the smallest to 1,070 in the largest. The average size was 202 *feirantes*, and the total was 5,275. These figures are for separate locations. On the average, each *feirante* operated in 2.1 fairs per week, although 42% operated in only one fair per week. Some of these additional fairs were outside of Recife. Of all *feirantes*, 74.3% sold food for home consumption and the remaining 25.7% sold household goods, food for immediate consumption, trinkets, plastic goods, clothes, furniture, cosmetics, soaps, etc. It should be noted that street fair size and composition varied from week to week depending on the weather, the crop season, the holiday season, etc. Just prior to street fair days, private businessmen (table suppliers) arrange tables and booths on the fair grounds. These fixtures are then rented to the fair merchants for use during the fair.

Most of the findings concerning street fairs are based on a survey of 210 *feirantes* in Recife made in May and June of 1967. Ninety-eight percent (206) of the respondents were actually the owners of the business, while 2% (4) were employees. The population for this survey was limited to *feirantes* selling food for home consumption.

Fixed Fairs

There are a number of groupings of small retailers into markets which are not street fairs because they operate every day, and are not public markets because they do not reside in one single market structure. These groupings will be referred to as fixed fairs. With the exception of one, the Afogados fixed fair, these fixed fairs are not considered as legal operations by the city government. Except for the Afogados fixed fair, which was built by the city government, these markets are spontaneous, unplanned groups of wooden booths and tables with no central organization or control.

There are nine fixed fairs in operation, ranging in size from 20 to 192 food operations. The total number of food operations at the time of this survey was 640. In addition, there were 64 non-food operations. Thus, 91% of fixed *feirantes* sold food for home consumption.

The following findings concerning fixed fairs are based on a survey of 75 fixed *feirantes* in Recife made in May and June of 1967. Seventy-three of the respondents, or 97%, were actually the owners of the business, while two (3%) were managers. The population for this survey was limited to fixed *feirantes* selling food for home consumption.

Public Market Retailers

Public market operators are those businessmen who sell goods within or along the outside walls of fixed large market buildings. The over-all characteristic of this kind of market is that one structure houses many compartments in which individual businessmen operate. The name "public market" comes from the fact that all but one of these structures are owned and operated by the city government. Individual retailers rent the compartments. There are ten of these markets in operation and more than three other private markets which are not in operation. The largest market in terms of food sellers is Santa Rita, which has 216 food retailers. The smallest is Santa Amaro, with 24 food retailers. There were a total of 920 compartment retailers in the ten markets. In addition, there were 208 non-food retailers. Thus, 82% of public market operators were selling food for home consumption.

The findings for public market retailers are based on a survey of 100 compartment retailers in Recife made in May and June of 1967. Of the respondents, 93% were actually the owners of the business, while 7% were employees. The population for this survey was limited to compartment retailers selling food for home consumption.

Neighborhood Retailers

Neighborhood stores are defined as those stores which exist as single units throughout Recife but are not self-service. There are four general types of stores included in this category: *barracas* (51%), *vendas* (39%), specialty stores (8%), and street vendors (2%).

A *barraca* is defined as a shabby wood single unit, usually of one room, which is not entered by the customers. *Barracas* usually carry some cereals, some canned goods, occasionally some

bananas, and usually soft drinks. A *venda* is typically a larger unit within a permanent building where the customer enters the store. *Vendas* have clerk service and handle cereals, canned goods and household items. Specialty stores are single-product stores which, for the most part, handle fresh and/or processed meats. Bakeries are not included in this research, as they are covered in the industrial analysis as food processors. Street vendors have non-permanent facilities which are usually removed daily. It should be noted that only neighborhood stores which sold food for home consumption were included in the survey. Thus, bars, restaurants and *barracas* which sold only beverages and prepared foods were excluded. In all, there were 2,285 neighborhood retailers in this population.

The findings related to neighborhood retailers are based on a survey of 444 neighborhood stores in Recife made in May and June of 1967. Most of the respondents (396 or 89%) were actually the owners of the business, while 48 (11%) were employees.

Self-Service Retailers

Self-service retailers are defined as those who do business by letting the customer select and carry products to a central location for tabulation and payment of the bill. Self-service retailers are typically larger than neighborhood stores, although there is some overlap between the very largest neighborhood stores and the smallest self-service stores. Many of the self-service group changed in recent years from the neighborhood store category by remodeling and expanding their facilities to accommodate self-service shopping. Most of the self-service stores are relatively small by supermarket standards and are typically called *mercadinhos*. At the time of this survey there were 42 self-service stores operating in Recife. Fifty-five percent of these had sales of less than NCr$10,000 (US$3,704) per week, 24% had sales of NCr$10,000 or more but less than NCr$50,000 (US$18,517) per week, and 7% had sales of greater than NCr$50,000 per week. No sales figures were given by 14% of the respondents, most of whom were small. Most of the self-service stores are independent of each other. The notable exceptions are the eight Comprebem stores in operation in the Recife area. There were four organizations which had two stores each in operation.

The findings on self-service stores are based on a census of all 42 self-service retailers in Recife made in May and June of 1967. Two self-service groupings--decision units and the stores themselves--are used in this section, depending on the analysis required. The

decision process for self-service stores is centralized in a single management team. Since one retail organization has eight stores, it is necessary to think in terms of 35 managerial units when behavioral characteristics of self-service retailers are considered. Since decision units are of prime interest, almost all analysis is based on these managerial units. When descriptive data about the stores themselves is considered, it is necessary to use the number of stores (42) as the population base. Of the management groups interviewed, 28 (80%) were actually owners of the businesses, while 7 (20%) were managers. Of the stores interviewed, 28 (67%) were owners, while 14 (33%) were managers.

Six Largest Retailers

It has been noted that the self-service retail category is made up of predominantly small operations. Thus, it is useful for comparison to present selected characteristics of the six largest self-service retail organizations (those with a sales volume of NCr$10,000 or more per week per store). These six retail organizations operate a total of 13 stores, each with sales of at least NCr$10,000 (US$3,704) per week. As in the self-service group, the number of stores will be used where store characteristics are presented. Otherwise, the six organizations form the population.

Other Retailers

There are several other types of retailers in Recife which need to be mentioned for completeness. These retailers are not included in the main analysis because of their small numbers. However, some of these groups are important in the changing retail structure and should be noted as special cases. The major retailer types in this "other" category are street vendors, consumer cooperatives, large frozen meat dealers, and government food stores. These types will be briefly described below.

Street vendors, legally defined as any mobile selling unit, are a small and decreasing segment of the retail food structure. Competition from other retail types, combined with changing consumer buying habits, has forced the street vendor to either go out of business or set up a semi-fixed location in the street, in fairs, in public markets, or in fixed fairs. Those who set up their businesses in the streets were included in the neighborhood store survey category. Those who gravitated toward the street fair, fixed fair, or public market were included in those samples. The remainder, who hawk their wares through the streets, are in-

consequential in number and sales volume, and serve only as a reminder of a bygone institution. No attempt was made to survey this latter group.

A census was made of the 11 consumer cooperatives in Recife. These cooperatives were sponsored by both private companies and the government for the benefit of their employees. All of the cooperatives were non-profit organizations selling mostly cereals and canned foods as close to cost as possible. None of the cooperatives were very large. The average sales volume of the 11 cooperatives was less than 1/2 that of the self-service stores.

The second type of retailer to be considered here is the large meat dealer who has extensive freezer storage capacity. These operations are differentiated because of their vastly greater volume, their investment in equipment and plant, and their ability to buy meat outside the Recife wholesale market. There are five of these large specialized meat dealers and each was included in the survey.

Finally, the government maintains 12 retail outlets (SAPS stores) which were designed to distribute basic food products at retail to help keep retail prices in line. Originally, these stores did not have to pay taxes, which allowed them to sell at comewhat lower prices. In mid-1967, however, a law was passed which stripped them of their tax advantage, and, by the time of this research, these stores resembled the small self-service store in terms of product lines and their costs were such that they did not differ significantly in price. Hence, during the period of this research, few consumers used these outlets and their significance was small. The SAPS stores were not included in the survey.

One approach to the presentation of the retail distribution system would be to analyze each of the above retail types, and thus provide a benchmark description of the system. However, this method of presentation would be lengthy and would not focus on the issues pertinent to this work. Differences between the various types of retailers can best be illustrated by a comparative presentation of the physical characteristics, decision rules, practices, performance, etc., of the retail institutions.

In order to simplify such a comparison and focus attention on real differences in the system, those retail types which play peripheral roles can be combined into three single weighted groups: atomistic retailers, self-service store operators, and neighborhood retailers.

Street fairs, fixed fairs and public markets have much in common--they are all very small operators with little capital who work alongside many other similar retailers in group marketplaces. Their characteristics, behavior and performance show little difference, so they will be grouped together for further analysis except where their characteristics differ significantly. The influence of various retailers in this group on the group statistics is weighted by the relative number of that kind of retailer in the actual population. For example, because there are about 6.5 times as many street fair operators as fixed fair operators, the resultant statistics for street fair operators are weighted 6.5 times those of the fixed fair operators. Because of the very small size of these operators, this group will be referred to as atomistic retailers from this point on.

The neighborhood retail category already forms a unique grouping that is spatially located throughout Recife, and thus will be used as is. The self-service category will include both the small and large self-service stores. Only where the very large self-service stores differ significantly from the rest of the group will these retailers be presented separately for comparison.

With these groupings in mind, a comparative analysis can be undertaken. Types of retailers will first be compared on personal demographic characteristics, then on physical characteristics, practices and decisions, performance, perceptions of their environment, and internal decisional predispositions.

Demographic Characteristics

A good place to start the analysis is to present background information on the characteristics of the respondents themselves.

There was little difference between the mean ages of the three groups. The mean for the atomistic retailers was 37 years; for the self-service, 39 years; and for the neighborhood retailers, 41 years.

Table 5.1 presents the results of the literacy-education index and shows that the differences between the three groups were very significant. This index (see Chapter 4) measures functional literacy. It is interesting to note that the average years of education for the three groups varied markedly, with the mean for atomistic retailers being 1.6 years; the neighborhood retailer's, 3.2 years, and the self-service retailer's, 7.7 years. It is also

interesting to note that 41% of the atomistic retailers had never attended school, while the averages for neighborhood and self-service retailers were 21% and 2%, respectively. It can be concluded from these educational and literacy levels that the majority of the atomistic retailers have neither the basic literacy skills nor the formal education to help them in their decision-making tasks as businessmen. More of the neighborhood retailers and almost all of the self-service retailers possess these basic skills. For those retailers who are illiterate or uneducated, the use of either the printed word or the printed mass media to gain information is precluded. Even the simple process of getting a license to operate in their fair becomes a fearful and costly problem, as these operators are often afraid of the government and wary of a procedure they do not understand.

Table 5.1 Demographic Characteristics of Food Retail Respondents by Retail Type

Characteristics	Atomistic Retailers	Neighborhood Retailers	Self-Service Retailers
% literate as defined by the literacy-education index	44%	67%	100%
% with second jobs	21%	18%	38%
Number of dependents			
0 - 4	30%	37%	45%
5 - 7	40%	33%	33%
8 - over	30%	30%	22%
Years in present type of business			
0 - 4	27	42	50
5 - 12	40	30	28
13 - over	33	28	22

SOURCE: SUDENE/MSU Retailer Survey (1967).

Retailers have more second jobs than the mean for the consumer head of households reported in Chapter 3 (see Table 3.1). On the average, those atomistic retailers with second jobs spend 20 hours per week on those jobs, while neighborhood retailers spend an aver-

age of 10 hours per week and self-service retailers an average of 19 hours per week.

Table 5.1 shows that self-service retailers have been in the retail business significantly fewer years than the other two types of retailers. In fact, 50% have been in the retail business less than 5 years.

The self-service retailers tended to have smaller families, with an average of 5.5 members (Table 5.1). Neighborhood and atomistic retailers had average family sizes of 6.0 and 6.3, respectively.

Physical Characteristics of the Retail Outlets

When considering the physical characteristics of the various types of retail outlets, the small number of self-service stores as compared to atomistic and neighborhood retailers should be noted in order to give a sense of perspective to the analysis and define magnitudes of deviation from the system average (Table 5.2).

Most of the atomistic and neighborhood retail units were owned by one person, while self-service stores often had more than one owner (Table 5.2). Of the three categories of retailers, a higher percentage of neighborhood store owners tended to own the buildings in which they operated; however, 69% of the stores of the six largest self-service groups were owned by the parent organization.

The average size of each retail type is presented in Table 5.2. It is interesting to note that, on the average, self-service stores were 11 times larger than neighborhood stores and neighborhood stores were 7 times larger than atomistic retailers.

Though the value of the retail structures is not easily determinable due to accounting complications caused by inflation, depreciation, etc., estimates of current replacement costs give as accurate a picture of the asset value of retail structures as is available (Table 5.2). Construction costs were obtained from retailers in the process of new construction and from several contractors. For modern construction such as a large self-service store, the cost per square meter was estimated as NCr$100. Traditional construction for the larger neighborhood stores (43% of the neighborhood category) was estimated at NCr$50 per square meter and for wood booths (51% of the neighborhood category) was estimated at NCr$18 per square meter. Hence, the mean construction cost for larger neighborhood stores was about NCr$2,400 (US$880) and, for

booths, about NCr$54 (US$20) (Table 5.2).

The atomistic retailers had few assets in terms of equipment. Sixty-three percent of this group used a scale, but most of these were rented. On the average, each atomistic retailers owned 1.4 hand tools such as knives, saws, etc. On the other hand, neighborhood retailers owned some fixtures; 83% owned at least one scale, and, on the average, each owned 2 hand tools. Importantly, 61% of

Table 5.2 Physical Characteristics of Food Retail Units by Retail Type

Characteristics	Atomistic Retailers	Neighbor. Retailers	Self-Serv. Retailers	Six Largest Retailers
Number of stores	5,560	2,285	42[a]	6
Ownership of Business				
Individual Proprietorship	92%	87%	34%	-
Family Business	5%	12%	9%	-
Partnerships	2%	2%	37%	-
Corporations	0%	0%	17%	-
% Who Own Store Location and Building	4%	58%	40%	69%
Mean Size ($m.^2$)	3	22	243	465
Mean Sales Volume NCr$ per week	532[b]	701	19,510	81,333
(US$)	(197)	(260)	(7,226)	(30,123)
Mean Asset Value of Building Regardless of Ownership NCr$	very	1,000	24,300[c]	46,500
(US$)	small	(370)	(9,000)	(17,222)
Mean Value of Fixtures and Equipment (NCr$)	N/A	N/A	46,106	162,000
(US$)			(17,076)	(59,999)
Mean Inventory on Hand NCr$	117	1,152	71,694	295,000
(US$)	(43)	(427)	(26,553)	(109,259)

[a]Includes the six in the "largest six" category.

[b]Includes all fairs attended in one week.

[c]This figure is overstated due to the fact that some of the self-service stores were valued above actual worth since they were really converted neighborhood stores.

SOURCE: SUDENE/MSU Retailer Survey (1967).

this group said that they owned refrigerators (although these were used primarily for the storage of beverages). The self-service retailers had a much greater amount of equipment assets (Table 5.2).

Finally, the differences in total value of the current stocks of salable products of the different types of retailers are tremendous (Table 5.2). Generally, atomistic retailers only stock products for immediate sale and do not carry stocks from one week to the next (the composition of these products will be dealt with later). The distribution of total owned assets by retail type is presented in Table 5.3.

Table 5.3 Levels of Asset Value of Food Retail Units by Retail Type

Asset Value	Atomistic Retailers	Neighbor. Retailers	Self-Serv. Retailers
NCr$0 to NCr$200.00 (US$0 to US$74.25)	70%	28%	0%
NCr$201.00 to NCr$500.00 (US$74.26 to US$185.37)	17%	15%	0%
NCr$501.00 and over (US$185.38 and over)	13%	57%	100%

SOURCE: SUDENE/MSU Retailer Survey (1967).

The employment characteristics of various retailers are of utmost importance because of the labor intensity of traditional marketing systems (Table 5.4). Together, atomistic and neighborhood retailers account for over 13,000 separate location jobs. However, it must be remembered that many of the atomistic retailers operate in several locations, most of which are outside the city. Thus, the real number of people is somewhat lower than 13,000.

As is to be expected, self-service stores have more owners and professional managers than other groups. They also hire more employees per retail unit and pay higher average salaries. It is interesting to note that of the employees (other than managers) of the atomistic and neighborhood retailers, 47% and 61%, respectively, were relatives without pay; 45% and 23%, respectively, were employees with non-fixed payments; and 8% and 16%, respectively, were employees with fixed salaries. In contrast, only 2% of the self-service employees were relatives with no pay, 4% were

Table 5.4 Labor Characteristics of Food Retailers by Retail Type (by individual location of retailers)

Characteristics		Atomistic Retailers	Neighborhood Retailers	Self-Service Retailers	Six Largest Retailers
Total persons in business		8,840[a]	4,319	387	-
Average persons per business		1.59	1.89	9.22	-
Average owners per business		1.05	1.02	1.29	-
Average work week (hours)		34[b]	83	57	-
Average weekly salary	NCr$	45.74	70.15	84.10	-
	(US$)	(16.94)	(25.98)	(31.15)	-
Average managers per store		.01	.05	.44	.77
Average work week (hours)		37	78	52	55
Average weekly salary	NCr$	20.38	36.62	60.70	101.20
	(US$)	(7.55)	(13.56)	(22.48)	(37.48)
Average other employees per store		.51	.82	7.49	15.20
Average work week (hours)		29[b]	58	51	48
Average weekly salary	NCr$	6.26	7.95[c]	34.51	35.04
	(US$)	(2.32)	(2.94)	(12.78)	(12.98)

[a]Based on locations.

[b]*Feirante* data reduced the averages because only one *feira* per week was included.

[c]Relatives with no pay are averaged into this figure.

SOURCE: SUDENE/MSU Retailer Survey (1967).

employees with non-fixed payments, and 94% were regular salaried employees.

The average number of years in the same location was 7 for all retail types. However, 27% of the atomistic retailers had been in their present location a year or less, while 30% of the neighborhood retailers and 34% of the self-service retailers had been in their present location a year or less.

The entry rate for all groups is high, indicating a high failure rate as well. Changes in consumer purchasing patterns in the past few years suggest that part of the self-service locational change can be explained by growth, while this is not the case for the atomistic and neighborhood retailers (see Chapter 4).

Atomistic retailers were located in commercial areas of the city (a commercial area was defined as one where at least 25% of the buildings in the block were used for commercial purposes), while 71% of the neighborhood retailers and 57% of the self-service stores were located in primarily residential areas of the city. The location of neighborhood retailers in residential areas supports the notion presented in the last chapter that these stores perform an important locational function. Further, street fairs and public markets are somewhat of a retail focal point, since 46% of the neighborhood stores and 43% of the self-service retailers were located within three blocks of one of these markets.

The products handled by various types of retailers indicate the nature of their operations. Table 5.5 presents the percent of various retailers by type who handle specific commodities or commodity groups. Though the atomistic retailers remain fairly homogeneous relative to the other groups, they have been split into their components because of differences in products handled. The atomistic retailers primarily handle perishables such as fruits and vegetables and fresh beef (except street fair operators, who handle more volume in other fresh meats than do the other types of retailers). Neighborhood stores and self-service retailers handle cereals, dairy products (excluding fresh milk), dried meat and canned goods. Many retailers in these two groups also handle eggs, and some self-service stores carry poultry. These configurations of product lines mesh with the shopping behavior data presented in the consumer chapter (Chapter 4). Percentages in Table 5.5 also indicate the degree of specialization of the retail types. Most atomistic retailers are specialized by product groups, while most self-service retailers carry many types of products, mostly non-perishables.

Table 5.5 Percent of Retailers by Type Carrying Various Commodities

Commodity	Street Fair	Fixed Fair	Public Market	Neighbor-hood Retailers	Self-Service Retailers
Rice	10%	13%	16%	50%	98%
Beans	11	13	16	51	95
Manioc Flour	15	13	16	52	95
Liquid Milk	--	--	--	5	7
Dairy Products[a]	--	3	--	34	81
Fresh Beef	6	13	27	6	7
Other Meat	15	11	10	37	81
Poultry	4	5	4	3	40
Eggs	--	NA	NA	47	50
Bananas	11	54	39	32	12
Other Fruits	34	54	39	32	12
Tomatoes	11	54	39	16	12
Other Vegetables	38	54	39	22	12
Canned Foods	5	--	--	39	100
Other	12	1	4	34	--

[a]Excluding liquid milk.

SOURCE: SUDENE/MSU Retailer Survey (1967).

This section has outlined the major components of the retail system in Recife. It was seen that atomistic retailers were individual proprietors who primarily sold perishables, usually from rented retail facilities. These operators owned little equipment and held small stocks for short periods of time. Neighborhood retailers were individual proprietors who usually sold less perishable foods from individual retail locations spread throughout residential areas of Recife. More than half of these neighborhood retailers owned their physical facilities. Inventory and equipment assets were vastly greater than those of the atomistic retailers. Finally, the self-service retailer had many more assets than the neighborhood retailer in terms of buildings, equipment and inventory. Further, though self-service retailers tended to sell foods with low perishability, they carried wider product lines than the other types of retailers.

Retail Practices and Decision Rules

Given the above background on the decision-maker and his business, the next consideration is how he runs his business. The behavior of the various types of businesses and the decision rules that lie behind those behaviors will be presented together, since decision rules must often be inferred from business behavior. In other words, the object is not to study the decision-making process but to understand what decisions are made as evidenced by business action. Value judgments will not be made, as there is no basis as yet for making them. The following section will demonstrate the effects of the behavior exhibited by the retail types. It should be noted that consumer reaction to the retail institutions presented in Chapter 4 already gives some indication of the value of functions performed.

Consumer-related Practices and Decision Rules

Price stands out as a variable which has as yet been neglected in our analysis. Since most of the factors used to attract customers are already fixed by location, fixtures, and mode of service, the only manipulatable selling variable for the majority of food retailers in Recife is price (advertising has only been used in recent years, and then only by the largest retailers). Also, as pointed out in Chapter 1, marketing improvements could be transferred to the consumer through decreased prices.

Table 5.6 presents some clear indications of the pricing behavior of the retail types. First, 28% of all retailers priced their products to match a real or imaginary market price, and there was no significant difference between retail types on this score. Second, there was strong agreement among all the retailers that if they bought for less than their competition they would sell for less than their competition. On this point, however, there was a statistically significant difference between the types of retailers, with 98%, 92% and 85% of the self-service, neighborhood and atomistic retailers, respectively, willing to pass purchase price gains on to the consumer. Finally, there was a large difference between types of retailers as to general price level. Of the self-service retailers, 53% reported that they generally sold for lower prices than their competitors, while 32% of the neighborhood retailers and 21% of the atomistic retailers reported doing so. Further, 63% of self-service retailers claimed that they used price to attract customers, while 24% of the neighborhood retailers and 21% of the atomistic retailers claimed doing so.

These four sets of pricing practices tell an important story about the retail structure of Recife. First, the atomistic retailers do not feel pressured to price at the market price. They price on a fixed margin, and do not try to sell below competition. As a matter of fact, they do not act as if they are conscious of being in competition with other retailers. They will readily reduce price, but do so to avoid spoilage (see next section) rather than for competitive reasons. On the other hand, the many self-service operators do not price to match competition, but they will price under competition and use price to attract customers. They are also more willing to pass on buying price advantages to the consumer through lowered prices. Thus, the self-service group clearly feel that they are competing with other retailers, and are willing to do so on a price basis.

The six largest retailers exemplify this point even more in that none price to meet competition, all pass on buying price advantage to the consumer, four out of the six compete on a price basis, and five out of six use price to attract customers. Neighborhood stores fall between the atomistic and self-service retailers with respect to their sensitivity to competition. All retailers tend to translate purchase price into selling price on a fixed margin, but the competitive behavior of the self-service group and the very large retailers is significantly stronger than that of the

Table 5.6 Practices and Decisional Characteristics of Food Retailers by Retail Type Concerning Customers

Characteristics: % Who	Atomistic Retailers	Neighborhood Retailers	Self-Service Retailers	Six Largest Retailers[c]
Price				
Sell same price as competition	28%	29%	17%	0/6
If buy for less than competition, sell for less[a]	85	92	98	6/6
Generally sell for lower price than competition[a]	22	32	53	4/6
Use price for customer attraction[b]	21	24	63	5/6
Sometimes reduce price to avoid spoilage[b]	96	82	81	5/6
Sometimes sell for less than cost[a]	87	63	33	-
Sort products on quality and differentiate price [b]	83	67	24	0/6
Cheating				
Think other retailers like themselves cheat their customers[a]	25	24	15	-

[a]Significant differences among retail types based upon chi-square test at 5% level of confidence.

[b]Significance of this relationship not tested.

[c]This column is presented for comparison but is not part of the significance test because of the small numbers in this group.

SOURCE: SUDENE/MSU Retailer Survey (1967).

other retail types. This is to say that those retailers who act competitively would tend to do more to make lower purchase prices a reality and to streamline operations to gain competitive advantage. This topic is vital and will be returned to as more data unfolds.

There are no standardized grades or grading procedures for food in Northeast Brazil, so it is interesting to see what quality differentiation takes place. Of all retailers, 92% indicated they reduced the price of foods in order to avoid spoilage. Further, 87% of the atomistic retailers said that they sometimes reduced prices below cost; 63% of the neighborhood retailers and 33% of the self-service retailers indicated they did so. Eighty-three percent of the atomistic retailers said they sorted products on quality and charged higher prices for the better products, while 67% of neighborhood retailers and 24% of the self-service retailers reported doing so. In interpreting these data, it should be remembered that atomistic retailers handle primarily highly perishable products that come to market in heterogeneous lots, while self-service retailers handle primarily non-perishable products and goods of homogeneous quality. As a result, pricing practices are governed by the supply situation in which the retailer finds himself. The street fair, which makes up the bulk of the atomistic retail group, is a natural sorting process, since it lasts not more than two days. The better quality products are selected out by both retailers and customers at the beginning of the fair and high prices prevail. But as the close of the fair approaches, the necessity of selling the stock (usually the lower quality products that remain) forces the price level down in proportion to the time remaining in the fair. Thus, because of time constraints and difficulty in maintaining quality, the system encourages price differentials.

Finally, 24% of the neighborhood and 25% of the atomistic retailers felt that other retailers cheated their customers on weights; fifteen percent of the self-service retailers suspected such cheating. This data corresponds roughly to the consumers' perceptions presented in the last chapter.

Supply-related Practices and Decision Rules

The first question concerning supply decision rules is where the various retailers acquire their supply. Table 5.7 presents sources of supply for various commodities by type of retailer. Most of the retailers of all types purchased their rice and beans

Table 5.7 Supply Sources of Selected Commodities by Retail Type
(in percents of retailers handling each product)

Commodity/ Retail Type	Established Wholesaler	Central Public Mkt. Wholesaler	Other Mkt. Wholesaler	Interior	At the Door	Other
Rice						
Atomistic	72	3	24	0	0	1
Neighborhood	67	2	21	0	3	7
Self-Service	76	0	0	3	0	21[a]
Beans						
Atomistic	62	5	26	3	0	4
Neighborhood	58	0	27	1	8	6
Self-Service	79	0	7	0	3	11
Manioc Flour						
Atomistic	23	4	11	54	0	8
Neighborhood	22	1	34	7	29	7
Self-Service	43	0	0	43	6	8
Fresh Beef						
Atomistic	0	0	12	16	--	72[b]
Neighborhood	4	0	0	12	--	84[c]
Poultry						
Atomistic	0	8	10	74	0	8
Neighborhood	7	0	0	14	14	65[d]
Self-Service	0	0	0	22	0	78[d]

(continued on next page)

Table 5.7, Continued

Commodity/ Retail Type	Established Wholesaler	Central Public Mkt. Wholesaler	Other Mkt. Wholesaler	Interior	At the Door	Other
Eggs						
Atomistic	0	20	10	50	0	20
Neighborhood	6	2	9	4	54	25[d]
Self-Service	8	0	0	42	0	50[d]
Bananas						
Atomistic	5	18	32	35	0	10
Neighborhood	5	23	50	1	8	13
Tomatoes						
Atomistic	8	66	14	6	0	6
Neighborhood	1	53	39	0	3	4
Other Fruits and Vegetables						
Atomistic	0	42	24	18	0	16
Neighborhood	0	33	42	2	0	23

[a]18% was purchased in the south of Brazil.

[b]67% was purchased at the Peixinhos slaughter facility.

[c]This 28% was purchased at Frigorifico do Nordeste and 56% at the Peixinhos slaughter facility.

[d]Most of this percentage was purchased from the Cogranja poultry cooperative.

SOURCE: SUDENE/MSU Retailer Survey (1967).

from established wholesalers in Recife. Manioc flour was also purchased from established wholesalers, but was purchased from market wholesalers and from the interior as well. Fresh beef was purchased largely from the Recife government slaughter facility, although some was purchased in the interior. Poultry and eggs were supplied to the majority of retailers handling such items by the poultry cooperative in Recife (Cogranja). Finally, fruits and vegetables were bought largely from market wholesalers, with some being purchased in the interior. Thus, low perishability foods are generally purchased from established wholesalers in Recife, while highly perishable goods are bought from market wholesalers.

The average number of suppliers used by the retailer types indicates that retailers generally use more than one supplier. These averages also indicate that, except in the case of fruits and vegetables, most retailers buy from a few regular suppliers (Table 5.8). This inference is confirmed by the fact that most retailers themselves reported they always dealt with the same set of suppliers (Table 5.9).

The transportation function from supplier to retailer is shared equally by the two parties (Table 5.8). Neighborhood retailers tend to take more responsibility for transportation than the other groups, while the self-service stores tend to take the least. These observations indicate that the self-service retailer uses his buying power to shift the transportation function onto the wholesaler. It is important to note that self-service retailers typically use truck transportation because of their volume purchases, while atomistic and neighborhood retailers almost exclusively use handcarts for local transportation. When these smaller retailers buy from the interior, they usually share a truck with many other small volume purchasers.

One of the links binding the distribution channel together and making it resistant to change is the credit relationship of buyer and seller. Of all the retail types, atomistic retailers use the most credit in all product categories listed in Table 5.8. Far fewer neighborhood stores and self-service retailers use credit. The nature of the credit practices is revealed by the pay-back period and cost of the credit. The normal pay-back period for self-service retailers is about one month. The cost of that credit, as measured by the interest charge and the price differential if the product had been purchased for cash, was negligible relative to the inflation rate of 27% per year during that time period. On

Table 5.8 Supply Sources of Selected Commodities by Retail Type

Commodity/ Retail Type	Mean Number of Suppliers	% of Trans. Arranged by Retailer			% Last Purchased on Credit	Pay-back Period (days)	% Annual Cost of Credit
		None	Some	All			
Rice							
Atomistic	1.8	46	8	46	61	9.2	409
Neighbor.	1.5	27	5	68	21	21.5	113
Self-Ser.	1.9	42	3	55	35	34.5	11
Beans							
Atomistic	1.8	48	7	45	59	7.7	485
Neighbor.	1.5	33	4	63	13	15.9	153
Self-Ser.	2.0	32	7	61	11	22.5	0
Manioc Flour							
Atomistic	3.7	47	5	47	37	5.0	774
Neighbor.	1.4	51	1	48	10	11.1	175
Self-Ser.	1.4	71	7	22	7	NA	NA
Fresh Beef							
Atomistic	1.4	72	0	28	81	5.7	489
Neighbor.	2.2	53	2	45	28	5.9	99
Poultry							
Atomistic	3.5	45	0	55	45	5.3	117
Neighbor.	1.4	46	2	52	7	NA	NA
Self-Ser.	1.0	44	0	56	22	NA	NA
Eggs							
Atomistic	1.8	60	0	40	50	6.2	190
Neighbor.	1.3	63	2	35	7	9.2	NA
Self-Ser.	1.0	75	0	25	17	NA	NA
Bananas							
Atomistic	2.4	40	6	54	23	3.1	281
Neighbor.	2.7	14	4	82	9	5.1	NA
Tomatoes							
Atomistic	2.7	20	4	76	34	3.8	726
Neighbor.	3.8	5	1	94	1	3.5	NA

SOURCE: SUDENE/MSU Retailer Survey (1967).

Table 5.9 Supply-related Practices and Decisional Characteristics of Food Retailers by Retail Type

Characteristics	Atomistic Retailers	Neighborhood Retailers	Self-Service Retailers
Supplier Used			
Always use the same set of suppliers[a]	77%	67%	82%
Price more than one supplier before buying[a]	68%	82%	94%
Reasons for using the suppliers they chose:[b] (allowed two responses)			
Price	18%	39%	45%
Quality	10%	10%	21%
Price & Quality together	14%	16%	5%
Delivery service	3%	8%	5%
Punctuality, good service	18%	9%	5%
Credit	26%	16%	5%
Trust, friendship	26%	22%	17%
Other	27%	10%	14%
Supply Price			
Buys for the lowest price, disregarding quality	17%	13%	7%
Feels suppliers sell for highest price possible	69%	65%	57%

(continued on next page)

Table 5.9, Continued

Characteristics	Atomistic Retailers	Neighborhood Retailers	Self-Service Retailers
Feel suppliers give discounts for regular customers	71%	57%	71%
Know how to evaluate quality	87%	69%	86%
Buy uniform quality regularly	91%	89%	78%
By the expenditure index used:[a]			
all resources for stock	53%	36%	17%
most resources for stock	12%	30%	13%
part resources for stock	35%	34%	70%
Tendency to buy enough:[a]			
for all customers	27%	38%	78%
to ensure all is sold	73%	62%	22%

[a]Significant differences among retail types based upon chi-square test at 5% level of confidence.

[b]Significance of this relationship was not tested.

SOURCE: SUDENE/MSU Retailer Survey (1967).

the other hand, atomistic retailers had to pay back their credit in less than one week on the average. This again reflects the nature of the street fair, where the operator buys new stock each week and the supplier requires repayment of the previous week's debt before he advances credit. Many suppliers and moneylenders require repayment at the end of the fair, which means that the repayment period is three days for many fair operators. This short-term credit costs the atomistic retailer from slightly over 100% to over 700% (Table 5.8). The atomistic retailer pays these high credit costs for three reasons. First, because the repayment period is so short, the cost does not look prohibitive. Second, these charges are buried in the product price that he pays and thus are not directly evident. Third, the small retailer has no choice. He has no alternative sources of money and if he cannot get stock to sell, he and his family go hungry. Thus, this high cost of operation is forced upon the atomistic retailer by both his lack of business competence and environmental circumstances.

Neighborhood retailers have longer pay-back periods than the atomistic retailers in most cases and certainly pay lower credit costs (99% to 175% per year). Even these costs, however, are high for those few who use credit.

It has already been pointed out that most retailers, and self-service retailers in particular, bought from a small number of regular suppliers. Table 5.9 indicates that 94% of the self-service retailers obtained priced from more than one supplier before buying. Other retailers did so to lesser degrees (82% and 68%, respectively, for neighborhood and atomistic retailers).

Wholesalers and other supply sources used by retailers have been presented and the nature of the relationship between retailers and suppliers has been examined. It is now appropriate to turn to the question of why retailers choose the particular sources of supply that they use. Table 5.9 shows that self-service retailers use price and quality as two separate, individual criteria more often than other retailers. Atomistic and neighborhood retailers gave price and quality together as a reason for purchase more often than self-service retailers.

On the other hand, greater percentages of the atomistic retailers than of other types saw punctuality-good service, credit, and trust-friendship as major reasons for using a particular supplier. Of all the retail types, self-service retailers considered these latter reasons as least important criteria. The difference between the atomistic and self-service retailers in reasons for supplier use

are apparent, with the neighborhood retailers falling in between the two. Toward the atomistic side, trust-friendship and credit are important to the neighborhood retailer, while price and quality considerations are the most relevant decision factors at the self-service end of the continuum.

Table 5.9 contains several other indications of retailers' feelings about supply prices which clarify the above price-quality relationship. When asked specifically about the price-quality relationship, few retailers of any type said that they bought for lowest price only, disregarding quality (17%, 13% and 7% of atomistic, neighborhood and self-service retailers, respectively, bought for price only). Of the atomistic retailers and neighborhood retailers, 69% and 65%, respectively, felt that their suppliers charged the highest prices possible, while 57% of the self-service retailers felt this. On the other hand, 71%, 57% and 71% of the atomistic, neighborhood and self-service retailers, respectively, felt that suppliers gave discounts to regular customers.

Most retailers tried to buy uniform quality from week to week and 82% of all retailers felt their colleagues knew how to evaluate quality. Differences between types were not statistically significant.

Atomistic retailers indicated that they used all their resources for stock when asked if they bought all the product they could pay for and if they could sell all that they could afford to buy. Most self-service retailers did not do this (Table 5.9). Neighborhood retailers, as before, fell in between the other two groups. When asked if they tried to buy enough to satisfy all demands or if they only bought what they were assured of selling, most self-service retailers chose the former, while the atomistic retailers chose the latter. Neighborhood retailers were in the middle again. These results are predictable, since the atomistic retailer does not have conditions for storage and has a low resource level with which to make purchases.

Conditions such as financial resources and buying volume determine the degree of choice each retailer has in choosing among supply alternatives. Survey data support the notion that, lacking the above, the atomistic retailer has little control over his operational environment, while the self-service retailers does to a greater extent.

Communications-related Practices and Decision Rules

Communication interactions are evident in the distribution channel between the retailer and his supplier. Of the atomistic,

neighborhood and self-service retailers, 63%, 52% and 49%, respectively, thought that most retailers in their group told suppliers what products their customers wanted. Sixty-eight percent of the atomistic, 74% of the neighborhood and 95% of the self-service retailers felt that their suppliers tried to offer the products that the retailers wanted.

Table 5.10 presents an index of total mass media exposure and of exposure to the individual media of retailers by type. Clearly, self-service retailers had more over-all exposure to the mass media than the other retail types and atomistic retailers had the least. When individual media were considered, self-service retailers had the highest exposure to printed media and television but the lowest exposure to radio. The use of mass media is one way to reach retailers with information and other persuasive messages about change. The data, however, indicate that many retailers could not be effectively or consistently reached by any single mass medium. The exception to this is the self-service retailer group, who seem to watch television regularly.

Practices and Decision Rules Related to Business Operation

The discussion of pricing practices pointed out the nature of competition among the retail types. Further data on the competitive practices of the retailers is provided in Table 5.11 under cooperation characteristics. Forty-six percent of the atomistic retailers entered into cooperative agreements on business practices with other retailers compared to 34% of the neighborhood retailers and 7% of the self-service retailers. Notably, 65% of the agreements made by atomistic retailers and 62% of those made by neighborhood retailers concerned price, while none of the self-service retailers made price agreements. This supports the earlier conclusion that atomistic retailers do not perceive that they are in competition with other retailers, while self-service retailers do feel competitive forces.

Fifty-one percent of the atomistic retailers belong to an association (Feirantes Union of Pernambuco), while 24% and 30% of the neighborhood and self-service retailers, respectively, belonged to trade associations. Three of the six largest retailers were association members. The fact that so many of the atomistic retailers belong to a union is important in terms of a possible method of reaching these retailers with new ideas or organized change.

All retail groups felt that location was important. Surprisingly enough, atomistic retailers most often agreed with locational importance. Location is a business variable that, within the limits

Table 5.10 Communications-related Practices of Food Retailers by Retail Type

Practice	Atomistic Retailers	Neighborhood Retailers	Self-Service Retailers
Vertical Communications			
Think most colleagues tell suppliers what products their customers want	63%	52%	49%
Felt that most suppliers tried to offer the products that they want	68%	74%	95%
Mass Media Usage			
Are exposed to mass media:[a]			
a little	41%	24%	0%
some	37%	42%	30%
a lot	22%	34%	70%
Read magazine or newspaper lately[a]	46%	56%	85%
Listen to radio at least one hour per day	30%	37%	10%
Watch television regularly[a]	12%	33%	95%

[a]Significant differences among retail types based upon chi-square test at 5% level of confidence.

SOURCE: SUDENE/MSU Retailer Survey (1967).

Table 5.11 Practices and Decision Rules Related to the Business Operations of Food Retailers by Retail Type

Characteristics: % Who	Atomistic Retailers	Neighborhood Retailers	Self-Service Retailers	Six Largest Retailers
Cooperation - Enter into the following business agreements with other similar businessmen:[b]				
Enter into no agreements	54%	66%	93%	5/6
Enter into price agreements	30	21	0	0/6
Enter into other agreements	16	13	7	1/6
Association Membership - Belong to a professional association or union[b]	51	24	30	3/6
Location - Feel good location is most important factor in helping sales[b]	95	80	70	-
Reinvestment - Would reinvest in own business if given sum equal to their yearly income[b]	37	62	71[c]	4/5[c]
Innovation - Use innovative practices:[b]				
a lot	13	23	68	6/6
some	29	32	30	0/6
a little	58	45	2	0/6

[a]Presented for comparison but not part of the significance test.

[b]Significant differences among retail types based upon chi-square test at 5% level of confidence.

[c]Figure based on owners interviewed, excluding managers.

SOURCE: SUDENE/MSU Retailer Survey (1967).

of the markets, atomistic retailers can control more readily than larger fixed location retailers. Good location is a constant concern to the atomistic retailers because they have to deal with obtaining a location each week.

The retailers were asked what they would do with a sum of money equal to a year's income if it were given to them. Table 5.11 shows that 71% of the self-service retailers, 4 out of 5 very large retailers, 62% of the neighborhood retailers and 37% of the atomistic retailers would be willing to invest the money in their own businesses. The response of the atomistic retailers is significant in that it indicates once again that these retailers do not think in terms of competing with other retailers or of getting ahead. It should be noted that, because they cannot accumulate capital, these retailers are under pressure to use windfall gains for home consumption.

Finally, the readiness of retailers to adopt new practices is indicated in Table 5.11. Retailers were asked if they marked prices, sold products that were new on the market, or protected products from spoilage by shading them from the sun (street fair operators only) or controlling rats and insects (other retailers). Clearly, the self-service retailers were far more willing and able to adjust to the changing Recife market.

Conclusions

In the study of retail practices and decision rules, analysis of price practices indicates that self-service retailers are more likely to pass on price advantages to their customers. They are also more willing to compete aggressively on a price basis by looking for ways to reduce price. The analysis of supply practices points up the fact that self-service retailers have more choices and alternatives with which to gain supply and price advantages. Finally, self-service retailers seem more willing to innovate and reinvest in their businesses. These implications will be amplified as perceived and internal limitations are discussed. However, before turning to that section, it is necessary to study the performance of the various types of retailers.

Performance Characteristics of Food Retailers

Two major questions about food retailers are yet unanswered: first, what functions and services do the retailers perform for whom; and second, how well do they perform these functions?

Functions and Services Performed by Retailers

Before outlining the functions and services of the Recife retailers, it is of interest to know for whom the services are intended. The answer seems obvious: consumers. However, some retailers sell to other businessmen as well. Table 5.12 shows that 10% of the atomistic retailers and 3% of the neighborhood retailers sell at least 25% of their volume to other businessmen. The remainder goes directly to consumers, as do all self-service store sales.

It is interesting to note that the smaller the retailer the more he feels that consumers are powerful. This conclusion is based on an index of perceived customer power (Table 5.12).

The next task is to understand the functions that each type of retailer performs. All retailers perform a transactional function and a bulk-breaking function. Since the latter is a direct function of the retailers' purchase size, the magnitude of the bulk-breaking function is much greater for self-service retailers than for atomistic retailers. Further, it has already been documented that many retailers accept the responsibility for transporting products from suppliers to their own place of business. Finally, every retailer has a locational function. Those types of retailing which aggregate volume by definition force the consumer to go greater distances than does the retailer type that spreads many small units into residential areas. Hence, neighborhood retailers play a more important locational function as a group than do either the self-service or atomistic retailers, who in the first instance aggregate sales and in the second aggregate selling units.

Other services that retailers perform for the consumer were presented in the chapter on Recife consumers as reasons why shoppers use various outlets. These include cleanliness, quality products, variety, service, etc. However, it is better to let the consumer judge these than to ask the retailer to do so. In considering actual practices such as giving customers credit, delivering purchases and staying open for consumer convenience, retailer perceptions are clearer than those of consumers.

As was to be expected, 61% of the neighborhood store retailers gave credit to some of their customers, while 20% and 26% of the atomistic and self-service retailers, respectively, did so. None of the six largest retailers gave credit. The following breakdown shows the extent of the credit services of the neighborhood retailers: of those giving credit, 68% gave about a fourth of their

Table 5.12 Functional Characteristics of Food Retailers by Retail Type

Characteristics: % Who	Atomistic Retailers	Neighborhood Retailers	Self-Service Retailers	Six Largest Retailers
Make some wholesale sales	10%	3%	0%	0/6
Feel the customers have a great deal of buying power and product knowledge (as defined by items listed below):	73	55	20	-
Feel that customers want quality, not low price	72	65	67	-
Feel customers know prices in competing stores	94	94	98	-
Feel customers shop around for best quality	84	68	29	-
Feel customers usually bargain on price	90	86	57	-
Give some retail credit	26	61	20	0/6
Deliver some retail sales	8	12	63	4/6
Average hours open (per store)	34[a]	86	58	52

[a]This figure is low because only one street fair was included per week (21 hours) for *feira* stall operators. The average hours given for fixed *feira* and public market retailers was 72 hours. The weighted average for all these outlets was 34 hours.

SOURCE: SUDENE/MSU Retailer Survey (1967).

customers credit, 19% gave half of their customers credit, and 13% gave three-fourths of their customers credit.

Sixty-three percent of the self-service retailers delivered goods for their customers, while 12% and 8% of the neighborhood and atomistic retailers, respectively, did so. Four out of the six largest retailers delivered purchases.

Other retail functions help explain the existence of the vast number of neighborhood stores. First, these retailers provide a relatively wide assortment of products as compared with atomistic retailers. Second, they provide these products within easy walking distance of most consumers. As most consumers, especially the poor, do not have access to convenient transportation, this spatial function tends to give the neighborhood retailer partial monopoly power, allowing him to price relatively independently of other retailers. Thirdly, the neighborhood retailers keep their businesses open long hours (mean of 86 hours per week as compared to 58 hours for self-service stores and 52 hours for the six largest retailers) to obtain customers who shop at odd hours. Neighborhood stores allow frequent small purchases, whereas the atomistic retailer and the self-service retailer both require larger volume purchasing due to the inconvenience of location and hours.

Measures of Retail Performance

It is now relevant to turn to the question of how well the various retailers serve the community and the development process. It should be noted that none of the measures used are absolute because the various retailers perform different functions. However, a general comparison of economic variables can be made.

Prices to Consumers - If any one economic measure pervades the system, it is the price of goods charged to the consumer. But even these prices fail to indicate what effect the institutions have on supply. Thus, only consumer benefit is measured. Also, quality must be measured along with price to give the prices meaning. Further, to measure price differences, it is necessary to measure the real prices paid after bargaining and cheating. Thus a special market basket price study was made to determine real price and quality differences. Two sets of market baskets were purchased by shoppers of varying backgrounds at a two-week interval. The real product weights as determined by reweighing after purchase were divided into the real costs as determined by expenditures to give a real price for each commodity in the market basket.

The only retail type which differed from the system-wide means was the self-service store (Table 5.13). It should be noted that the system-wide means included the self-service responses as well. Not all of these self-service retailers carried the full basket of commodities, so it is necessary to indicate the number of samples of each commodity taken. Further, the four self-service stores were among the larger volume group of all self-service stores. These four stores were selected because of geographical dispersion through the city.

The quality of the commodities was judged on a three-point scale arbitrarily set up for each commodity. No usable standardized grades exist in the system. On this scale, 1 represented poor quality, 2 represented mediocre quality, and 3 equaled good quality. The quality standards were relative, so it was necessary to ensure that all commodities of one type were judged by the same inspector. To further strengthen the judging process, an expert trained in food handling and processing was placed in charge of setting standards and inspecting. This expert also inspected the difficult-to-judge food categories, such as meats, where a knowledge of beef fiber structure was needed. Most of the fruit and vegetables were judged on the basis of freshness or, conversely, the degree of spoilage. Finally, cereals were judged on type, impurities and spoilage.

Before specific conclusions can be made concerning price levels between the system as a whole and self-service retailers, it is necessary to determine if there are quality differences between the two. The Wilcoxen Signed Rank Test was used to determine if the quality of the four self-service stores sampled was different from that of the total retail system. This test compares the product means of each group. With a .05 chance of error, the qualities of the two groups of means were from different populations, with the mean quality of the four self-service stores being higher. Likewise, the hypothesis that the Bom Preço product quality is better than the retail system mean can be accepted at the .05 level of significance.

Clearly, the four self-service stores usually sold at lower prices for goods of better quality. The exceptions were rice (which sold for 2.6% more in self-service stores for the same mean quality), chickens (which were 13.3% higher, though this was for better quality plucked and cleaned chickens vs live chickens), and cheese (which was 5.2% higher in price but of considerably higher quality). It is interesting to note that the largest self-service

Table 5.13 Price and Quality Levels for All Retailers, Four Self-Service Stores and One Large Supermarket

Product	All Recife, Average		4 Self-Service Stores				Bom Preço			
	Price (NCr$)	Qual. Index[a]	Price (NCr$)	N	Qual. Index[a]	% Price Difference	Price (NCr$)	N	Qual. Index[a]	% Price Difference
Beans	.470	1.7	.430	8	2.0	-8.5	.430	2	2.0	-8.5
Rice	.780	1.7	.800	8	1.8	+2.6	.680	2	2.0	-12.8
Manioc	.480	2.3	.440	8	2.7	-8.3	.450	2	3.0	-6.3
Bananas	.025	1.9	.023	3	2.0	-6.9	.025	2	2.0	0.0
Tomato	.590	-	.500	4	1.5	-15.2	.530	2	2.0	-10.2
Pumpkin	.370	1.7	.250	3	2.3	-32.4	.280	2	3.0	-24.3
Onion	.850	1.6	.750	3	2.3	-11.8	.750	1	3.0	-11.8
Lettuce	.127	1.4	.110	4	1.0	-13.4	.100	2	1.0	-21.3
Xuxu	.078	1.8	.050	3	2.0	-35.9	.050	2	2.0	-35.9
Eggs	.109	2.0	.098	6	2.0	-10.1	.090	2	2.0	-17.4
Meat	2.680	1.7	--	0	-	--	--	0	-	--
Chicken	2.610[b]	1.5	2.980[b]	4	2.0	+13.3	3.050[b]	2	2.0	+16.9
Fish	1.510	1.7	--	0	-	--	--	0	-	--
Cheese	3.520	2.0	3.820	6	3.0	+5.2	3.450	2	3.0	-2.0

[a] 1 = poor quality, 2 = mediocre quality, 3 = good quality.

[b] Self-service stores sold the chickens cleaned and plucked, whereas the rest of the retailers sold their chickens alive.

SOURCE: SUDENE/MSU Retailer Market Basket Price Study (1967). Each retailer was interviewed both in August and September.

retailer, Bom Preço, sold at prices that were lower than the system means in all cases except for chickens, where additional quality and services were added. On critical staple items, the self-service retailers generally underpriced the system, with the exception of rice. It is interesting to note that those self-service stores that handled fruits and vegetables consistently underpriced the system, and, with the exception of lettuce, gave as good or better quality. Thus, it may be concluded that self-service retailers can and do, on the whole, bring to the consumer better quality and lower prices on selected staple and perishable foods. It should be remembered that, since manioc flour and beans make up the largest part of the consumption of the lower income consumers, price decreases on these items have the greatest effect on the income of that consumer group.

One of the important performance measures among the various types of retailers is the degree to which spoilage occurs. Spoilage in any form is a symptom of inefficient operation and is a direct loss to the economic system. An inventory of products represents value that has been created by the economic system; spoilage reduces that value by some amount, resulting in economic loss. The consumer pays more for poorer quality and the retailer has his profit squeezed. There are two degrees of spoilage which should be noted. First, goods may spoil but remain salable at reduced prices. The criteria used for this kind of spoilage is the reduction of price to cost or below because of spoilage. Second, goods may spoil to the extent that they are unsalable at any price. The amount of spoilage for the several retail types is presented in Table 5.14.

The method of estimating these two spoilage rates was to ask the respondent to estimate the number of units/hundred that he sold at either his purchase price or lower because of spoilage, shrinkage or rodent damage. The same question was then repeated for the number of units that he lost or could not sell at any price.

Table 5.14 shows the different spoilage rates for selected commodities. Rice typifies the kind of spoilage figures for the cereals group of commodities. For spoiled but salable rice, the atomistic, neighborhood and self-service retailers reported 7.4%, 1.2% and .5% spoilage rates, respectively. Unsalable spoilage rates were reported to be 2.5%, .8% and .5%, respectively. The spoilage rates for perishables, as demonstrated by bananas, was much greater. Spoiled but salable bananas made up 26.4% and 11.7% of the volume of atomistic and neighborhood retailers, respectively, and the unsalable spoilage rates for these retailers were 12.1% and 9.7%, respectively.

Table 5.14 Spoilage Rates for Selected Commodities, by Retail Type

Product	Atomistic Retailers		Neighborhood Retailers		Self-Service Retailers	
	Salable at reduced price %	Unsalable %	Salable at reduced price %	Unsalable %	Salable at reduced price %	Unsalable %
Rice	7.4	2.5	1.2	0.8	0.5	0.5
Beans	9.2	2.8	0.9	0.8	0.3	0.3
Manioc flour	8.4	3.2	1.3	1.0	0.6	0.5
Liquid milk	-	-	0.0	0.6	N.A.	N.A.
Fresh meat	22.6	6.3	12.8	4.0	N.A.	N.A.
Poultry	18.9	9.2	0.4	0.9	0.0	0.4
Eggs	11.5	6.9	1.6	4.0	0.6	1.1
Bananas	26.4	12.1	11.7	9.7	N.A.	N.A.
Tomatoes	24.9	11.0	4.7	5.3	N.A.	N.A.

SOURCE: SUDENE/MSU Retailer Survey (1967).

It is useful to combine the spoilage rates for rice, beans and manioc flour into one spoilage rate for comparison of the types of retailers. It is assumed that spoiled but salable goods are reduced in price on the average of 20%. Thus, the loss to the system from such goods is 20% times the percentage of spoilage. This figure is then added to the unsalable spoilage to give an over-all loss figure. This over-all loss figure can then be combined across product type losses by weighting by volume of sales. For atomistic, neighborhood and self-service retailers, the combined mean spoilage lost to the system for rice, beans and manioc flour is 4.6%, 1.1% and 0.5%, respectively.

Thus, the atomistic retailers had remarkably high spoilage rates, while the neighborhood stores tended to have higher spoilage rates than those of the self-service retailers. It is interesting that the six largest retailers had virtually no spoilage for rice, beans and manioc flour. Thus, one of the weaknesses of atomistic retailers is the loss to the economic system which occurs at this distribution level. The retailer cannot be totally blamed for the spoilage, however, since poor practices back in the channel may significantly shorten product life.

Price Margins - Although price margins are often used as measures of efficiency, they have some inherent problems of concept and measurement. Such is the case here. The method used to collect margins in this study was to observe and/or ask what the actual selling prices of each quality of selected commodities were. Further, the amount the retailer paid for each quality was obtained, along with the amount he bought in his last purchase and how often he purchased that type of commodity. Each purchase price was subtracted from each selling price for each commodity type and quality level and was then expressed as a percentage of selling price. These margins were then weighted by volume per day, obtaining a mean margin by commodity. These margins were then combined to get mean commodity margins by retail type. It should be pointed out that reduced sales prices for partly spoiled but salable goods affected the margin estimates. Hence, negative and reduced margins due to spoilage were averaged into the over-all margin figures.

Though the larger self-service stores have lower prices, they do not have lower margins (Table 5.15). However, interpretation of these margins, as explained above, must take into account several factors. First, it must be remembered that most of the self-service stores are converted neighborhood stores with higher fixed costs in

terms of fixtures and equipment, yet most still lack the high volume, low margin merchandising policy which permits increased revenues to cover increased costs.

Table 5.15 Mean Price Margins for Selected Commodities by Retail Type

Product	Atomistic Retailers %	Neighborhood Retailers %	Self-Service Retailers %
Rice	11.8	10.5	15.2
Beans	13.0	12.2	16.5
Manioc	16.7	13.8	16.6
Liquid Milk	N.A.	7.4	N.A.
Fresh Meat	13.7	20.0	N.A.
Poultry	13.5	17.9	9.3
Eggs	9.8	11.4	12.6
Bananas	19.4	23.4	--
Tomatoes	22.4	18.8	--

SOURCE: SUDENE/MSU Retailer Survey (1967).

Second, only one of the self-service retailers was observed to have grasped the concept of "mixed margins," which uses decreased margins or high volume staple foods to draw increased volume while making up the difference on such high margin goods as cosmetics and other non-foods. Thus, one of the potential strategies of the multi-product retailer has not yet been utilized by this group.

Third and most importantly, margins were based on prices in effect at the time of the interview and the retailers' most recent supply price. Thus, a systematic bias was introduced because of spoilage. For the self-service retailers who, as seen above, experienced little spoilage, the margin reflected a full margin for unspoiled goods. On the other hand, the atomistic and neighborhood retailers had higher rates of spoilage and thus the margins calculated on actual present price were considerably lower due to the influence of the reduced price of the spoiled commodities.

Thus, it is difficult to draw precise conclusions based on a comparison of margins between the retail types. Clearly, if simple price margins are compared, the self-service stores have higher

margins. But if the quality of the products that the consumer received is considered, these margins become questionable as measures of value. That is, the spoilage which is a loss to the system caused by poor practices and inefficiency of the retailers and the distribution channel makes these same retailers look spuriously efficient by causing them to reduce their prices to sell the spoiled goods.

Growth - Retailers were asked if in the past year their sales had increased or decreased in terms of physical volume and by how much. Their responses were combined into a growth index which ranged from 1 (decreased a lot) to 5 (increased a lot). No change was represented by 3. Table 5.16 shows that the atomistic and neighborhood retailers felt that their volumes had declined slightly, while the self-service group felt some growth and the six largest felt rapid growth. Table 5.16 also shows that although the atomistic, neighborhood and self-service retailers expected some physical volume growth, the largest six retailers expected substantial growth. It is interesting that all retail types felt optimistic for the future. Again, the largest self-service retailers seem to be making the most rapid inroads into the retail structure.

Table 5.16 Changes in Sales Volume by Type of Retailer

Characteristics	Atomistic Retailers	Neighbor. Retailers	Self-Ser. Retailers	Largest 6 Retailers
Index of sales change last year (1 = decreased a lot, 3 = same, 5 = increased a lot)	2.8	2.8	3.2	4.3
Index of expected sales change next year	3.2	3.5	3.8	4.6

SOURCE: SUDENE/MSU Retailer Survey (1967).

Productivity Measures - Two noteworthy productivity measures are detailed in Table 5.17. In terms of labor use as a resource, the self-service retailers had greater sales per man-hour than the other types, with neighborhood stores being the least efficient in terms of labor use. On the other hand, atomistic retailers sold

more per asset value than did the other retailers, with self-service retailers being least efficient in this regard. Asset value was considered to be owned assets when sales per asset value was calculated and was considered as all assets used in the business when the value added index was computed. The results are as expected, with the capital-intensive methods of retailing showing better use of labor resources and the labor-intensive retailers showing more efficient use of capital (in this case, due to its lack of use).

Table 5.17 Productivity Measures by Type of Retailer

Productivity Measures	Atomistic Retailers %	Neighbor. Retailers %	Self-Ser. Retailers %
Weekly Sales per Man-Hour:			
0 - 2 NCr$/hr.	48	75	0
3 - 7 NCr$/hr.	31	19	20
8 - over	21	6	80
Weekly Sales per NCr$ of Asset Value:			
0 - 369	17	71	100
370 - 1,059	41	19	0
1,060 - over	42	10	0

SOURCE: SUDENE/MSU Retailer Survey (1967).

Summary - It seems clear that the self-service retailers are making demonstrable inroads into the food marketing system in terms of reduced spoilage, lower prices and an increased share of total market sales. However, it remains uncertain whether these firms are more efficient internally than smaller scale traditional outlets. The study did show that the larger retailers were selling better quality products for lower prices than the average for other firms in the system. If these retailers are not more efficient internally, then they must be able to obtain lower prices from suppliers through large-volume purchasing and pass the savings on to the consumer.

Barriers to Change

Thus far, this chapter has built a background picture of food retailers that operate in Recife. The present section will attempt to expand this picture to include some notions of how the food retailer is constrained by his view of the economic and social system and by some of his personal predispositions.

It is important to distinguish at the onset between the retailer's perception of his world and the actual limitations which exist in that environment--what the retailer perceives and believes forms the basis for his behavioral decisions regardless of the accuracy of these perceptions or beliefs. Thus, to understand why retailers do not, for example, try to increase volume and reduce costs, it is necessary to study their perceptions and beliefs as to what constrains them. Further, analysis of possible reforms designed to increase retailer market expansion and use of more efficient methods must take into account these perceptions and beliefs.

For convenience, "perceived barriers" are defined as those perceptions or beliefs which limit the decisions of retailers to increase volume and attempt to gain greater profits.

For organizational purposes, barriers have been broken down into two sub-groups as follows:

1. Barriers which are perceptions of external conditions to the decision-maker which make the risk of increased market participation seem greater than the expected value of the increased participation.

2. Barriers which are internal beliefs or values of the decision-maker which influence his capacity to make and implement market participation decisions. It is important to note that the internal barriers are more basic than, and often color the perceptions of, external barriers.

Some notes on methodology need to be made before the various barriers are analyzed. Perceived external barriers were obtained in two ways in an attempt to develop a realistic list. First, the respondents were asked a series of questions (response yes, don't know, or no) about the limitations imposed on their expansion by various potential barriers. Further, a similar series of questions was asked concerning the limitations on their profits. Finally, a series of questions was asked about the practices of their suppliers, customers and colleagues. All of these questions were designed to allow the respondent to judge barriers as they applied to his situation.

Second, the respondent was asked to cite the most important limitations on his expansion. This open end question was designed to allow him to place emphasis on those barriers which were foremost in his mind.

The two sets of questions were independent. However, the first type of questioning formed a set of references for the second type which aided the respondent by getting his mind on the subject of limitation, yet possibly caused biased results by closing the respondent's mind to unmentioned alternatives. This eventuality was guarded against by careful pretesting to obtain all alternatives in advance as well as by careful ordering of the questions.

Internal barriers were uncovered largely by questions aimed at various attitudes and beliefs held by the respondent. Each question was in the form of a statement with which the respondent was asked to agree or to disagree. The "don't know" responses formed the middle category. Groups of these questions together indicated various internal barriers. The questions were grouped to form an index. Each response was assigned a number (1, 2 or 3) depending on agreement or disagreement with the statement. The index was the sum of the responses for a group of questions divided by the number of questions in the group. The result was a number between 1 and 3, with 1 showing that the internal barrier existed and 3 showing that it did not.

The remainder of this part of the chapter will be devoted to describing the two barrier levels for the retailer types described in the previous section. Thus, analysis shifts from a look at the retailer from the outside to a look at the retailer's world from his viewpoint.

External Barriers

The object of this section is to try to isolate those things which retailers feel inhibit their success and growth in business. However, some retailers do not want to expand their businesses because they are satisfied with what they have, because they do not think it possible, or because the thought has not occurred to them. It is interesting that among the poorest retailer group a higher percentage did not desire to expand their businesses. Of the atomistic retailers, 25% held this position, while 17% of the neighborhood retailers, 9% of the self-service retailers, and none of the largest retailers lacked desire to expand. The questions that pertain to expansion in this section were asked of those who indicated an interest in expanding.

Before specific external barriers are presented, it is useful to make one more observation about barriers in general. On the average, the atomistic retailers were not clear as to the adverse factors facing them in their environment and agreed more readily than other retailers that all the barriers were important. This lack of ability to distinguish barriers can be demonstrated in two ways. First, if all the external barrier questions are made into an index as described above, atomistic retailers clearly have a higher agreement rate on barriers than the other retail groups. A further measure of lack of specificity of barriers is the percent of barrier questions that more retailers agreed with than disagreed with. These two measures are presented in Table 5.18.

Table 5.18 Clarity of Barrier Perception by Retail Type

Measure	Atomistic Retailers	Neighbor. Retailers	Self-Ser. Retailers	6 Largest Retailers
Response Tendency Index (1 = agree with all barriers, 3 = disagree with all)	1.68	1.81	1.98	2.37
% of External Barrier Questions with More Barrier than Non-Barrier Responses	91	77	50	23

SOURCE: SUDENE/MSU Retailer Survey (1967).

As we go from atomistic to neighborhood to self-service to very large retailers, the barriers become fewer and clearer in the retailer's mind. There are two reasons for this trend. First, the small retailer may not have the ability to sort out those factors which restrict him, and thus all things seem oppressive. Second, more barriers in fact exist for the small retailer because he does not have the ability or resources to alter his environment as much as the large retailer. The internal barriers presented later in this chapter will further reveal the differences among retailer groups' views of their environmental situation.

The relative importance of various barriers to expansion is presented in Table 5.19. Clearly, most retailers viewed the lack of money as paramount, with the very large and small stores agreeing in greater proportions than the average self-service retailer.

Table 5.19 Relative Importance of Perceived Barriers to Expansion, by Retail Type

First responses and total of three responses. The most important problems preventing more expansion:	Atomistic Retailers %		Neighborhood Retailers %		Self-Service Retailers %		Six Largest Retailers	
	First	Total	First	Total	First	Total	First	Total
Lack of money	71	79	89	94	53	66	4/6	5/6
Lack of sales	15	26	3	13	3	19	-	-
Poor location	3	9	2	13	6	9	-	-
High product prices	2	6	0	7	0	0	-	-
Lack of supplies	3	5	1	2	3	3	-	-
Too much competition	2	5	1	5	16	19	-	-
Government laws	1	2	1	1	0	6	-	-
Other	3	9	3	10	19	31	-	-
	100		100		100			

SOURCE: SUDENE/MSU Retailer Survey (1967).

The lack of sales was seen as somewhat important and competition was seen as important by the self-service retailers.

The view of competition by the various retailers is important, as it again shows the differences among operational modes of these retailers. The atomistic and neighborhood retailers do not feel that they are in a competitive race for survival. The changes in the retail structure in recent years has not yet reduced their sales enough to bring realization that a change has occurred. The advent of the large self-service retailer, however, has markedly affected the retail structure, and the change agents themselves see the implications of their actions. This conclusion will be amplified shortly.

Table 5.20 shows the results when respondents were asked what were the important limitations on profits. The lack of money was seen as relatively less important, while the lack of demand was seen as more important. Again, the self-service retailers showed a concern for competitive forces that the other types did not feel.

Having determined the relative importance of barriers to the retail types, the individual barriers can now be analyzed. Table 5.21 presents the findings of the series of questions pertaining to expansion problems. The percentages indicate relative importance of various limitations, but the orders of magnitude between barriers are not as clearly shown as in the preceding analysis. The larger the retailer, the greater was the percentage who felt they could obtain loans at reasonable costs and the smaller was the percentage who felt that the lack of regular customers, irregular supply of presently-carried products, general competition and the danger of floods were important reasons for not expanding. Again, the self-service retailers considered competition from supermarkets as important as any of these barriers. Though many of the smaller retailers sensed competition from supermarkets, they viewed it as less important relative to other barriers, and competition is not a determining factor in their behavior. None of the very large retailers saw the threat of supermarkets as important, demonstrating that they feel that they can control their success in a competitive environment. The other self-service retailers see supermarket competition as relatively important because they feel the competitive environment but do not have the resources to compete.

The perceived limitations on profits are presented in Table 5.22. These findings, when combined with those on the barriers to expansion, lead to some interesting conclusions. First, it should

Table 5.20 Perceived Relative Importance of Limitations on Profits, by Retail Type

First responses and total of three responses. The most important problems preventing higher profit:	Atomistic Retailers %		Neighborhood Retailers %		Self-Service Retailers %	
	First	Total	First	Total	First	Total
Lack of money	31	37	67	76	33	33
Lack of sales	32	42	14	24	18	24
Poor location	2	4	3	9	0	6
High product prices	8	13	4	12	3	3
Lack of supply	10	11	3	4	12	12
Too much competition	6	10	4	13	21	24
Government laws	0	1	0	1	3	8
Other	11	15	5	10	10	21
	100		100		100	

SOURCE: SUDENE/MSU Retailer Survey (1967).

Table 5.21 Perception of External Barriers to Expansion Held by Retailers Who Desire to Expand, by Retail Type

Most important reasons preventing more expansion	Atomistic Retailers %	Neighborhood Retailers %	Self-Service Retailers %	Six Largest Retailers
Lack of ability to obtain loan	78	74	41	1/6
High cost of borrowing money	73	73	56	2/6
Lack of regular customers	90	73	59	0/6
Difficulty of finding good location	79	56	56	2/6
Irregular supply of presently carried products	74	60	31	1/6
Competition from supermarkets	60	51	59	0/6
General increase in competition	65	57	41	0/6
Danger of floods	56	34	16	0/6
Risk of changes in current policy and laws	37	30	44	0/6
Do not desire to improve	25	17	9	

SOURCE: SUDENE/MSU Retailer Survey (1967).

be noted that demand variation was seen as important by atomistic and neighborhood retailers relative to both expansion and profits. Self-service retailers considered it unimportant relative to both expansion and profit. On the other hand, irregular product supply was seen as important to expansion and to profits by 74% of the atomistic retailers and by 56% of neighborhood retailers. In comparison, 31% of the self-service and 1 out of the 6 largest retailers saw irregular supply as an important limit on expansion, and 57% and 4 out of 6, respectively, saw irregular supply as an important limitation on profits. This indicates that the small retailer feels that he can do little to alter the adverse environment surrounding him. Self-service and large retailers recognize that

Table 5.22 Perception of External Barriers to Profit by Retail Type

Most Important Reasons Limiting Profits	Atomistic Retailers	Neighbor. Retailers	Self-Ser. Retailers	6 Largest Retailers
Varying quantities customers purchase weekly	74%	68%	43%	1/6
Varying prices	85%	76%	83%	6/6
Product spoilage	86%	61%	49%	2/6
Irregular supply of product	74%	56%	57%	4/6
Competition	76%	69%	69%	3/6
Lack of information about price	62%	45%	43%	2/6
Lack of information on quantity of products available	57%	43%	43%	1/6

SOURCE: SUDENE/MSU Retailer Survey (1967).

there are problems to profitability, but feel they can solve them. They do not feel that these problems block expansion. Though there are no other direct comparisons between perceived limitations to expansion and profit, the responses on the effect of price variation as a profit limitation support the notion that self-service stores recognize that uncertainties limit their profits.

It is interesting to digress a minute on the perceived need for information on price and market volumes. All retailers placed

these needs relatively low on their lists of limitations. However, problems of price and supply fluctuations were placed high, especially for the smaller retailers. This shows a lack of realization that information is a tool for combating those fluctuations complained about.

To summarize, as the types of retailers were viewed along the spectrum from atomistic retailers to very large self-service stores, the perceived barriers became clearer in the minds of the respondents and fewer in number. All retailers felt that lack of money was an important limitation; but progressing from small to large along this continuum, the nature of the limitation changed. For the small retailer, inability to obtain a loan was important, while at the larger end loan cost was seen as a limitation. Chapter 6 will return to the problem of financing and will present the nature of this problem in more detail. The small retailers saw lack of demand as more important than did the large retailers, while larger retailers viewed competition as more important. The very large retailers, though conscious of the effect of competition on their profits, saw competition as less of a barrier to expansion. Thus, as retailers became larger, their view of competition shifted from a position of less concern about competition, to competition as a limitation to expansion, to competition as a controllable force to be dealt with. The group taking the last position is most beneficially affected by competition. This point shows again the passive nature of the small retailer and the competitive nature of the larger retailers. All retailers saw variable prices as a major problem, yet the small retailers placed more emphasis on the uncertainties of market supply and demand than did the larger retailers when expansion was involved. Finally, the small retailer considered spoilage an important factor, whereas the larger retailers did not. Spoilage, too, becomes a controllable variable for the larger retailers.

Internal Barriers

The most instructive way to summarize the internal barriers which color the actions and perceptions of various retailers is to compare the questions and indices representing various aspects of their beliefs and values.

Because these questions were discussed in detail in the chapter on Recife consumers (Chapter 4), they will not be repeated here. Only the trends and implications will be briefly noted.

The larger and more active the firm, the less its decision-maker is affected by social sanctions of his peer group (Item 1, Table 5.23), the less he is locationally affected by his family (Item 2), the more he believes in small families (Item 3), the less he believes in fate (Item 4), the more he is willing to build toward the future (Item 9) and the more he believes in managerially manipulating his controllable variables (Item 10). Interpersonal trust does not follow the same pattern. The atomistic retailers have a higher level of interpersonal trust than the neighborhood and self-service store retailers. The six largest retailers have the highest interpersonal trust of all retail types (Item 13). Finally, on a combined scale of modernity, the decision-makers of the large, active retailers are clearly more modern (Item 17). Thus, in terms of active, thoughtful ability to change, the larger firms' end of the continuum stands out well beyond the atomistic end. The smaller retailers are simply less able to break away from the traditional system of distribution, which has as its basis an inherent inability to adapt to the modern needs of a changing and developing area.

Summary and Conclusions: Retail Distribution

The purpose of this section has been to present an analysis of the retail structure of Recife in such a way as to highlight the basic differences in the system as well as to present the data base which provides the answers to the questions outlined at the beginning of the chapter. These questions were essentially as follows: Do marketing barriers impede production responses of retailers such that efficient scales of operation cannot be reached? If these barriers exist, what factors are responsible for maintaining the status quo? And finally, how can these factors be changed to allow for more efficient distribution? The answers to these three questions have been developed by attacking the meaningful differences in the characteristics of the retail structure--the differences in the managers, physical characteristics, practices, functions, performance, perceived limitations and internal predispositions. A brief summary statement of the conclusions derived from this analysis follows.

Retailers can be thought of as being on a size-and-behavior continuum. This spectrum begins with the small atomistic retailer, who is more passive in the face of his changing environment than the other retail groups. At the other extreme is the large super-

Table 5.23 Internal Barriers by Retailer Type
(1 = traditional response,
3 = modern response)

Item No.	Item	Atomistic Retailers	Neighborhood Retailers	Self-Service Retailers	Largest Six Retailers
1	Neighbors do not want you to prosper	1.59	1.50	1.83	2.17
2	Better to live near family and earn less	1.32	1.38	2.29	3.00
3	Large family better than small family	2.60	2.74	2.89	3.00
4	Index of fatalism	1.73	1.84	2.26	2.75
5	Businessmen cannot do much to improve	1.83	1.73	2.11	2.67
6	It is better to leave things alone and wait	1.69	1.83	2.26	2.67
7	It is better to live for today because tomorrow is uncertain	1.33	1.65	1.91	2.67
8	It would be better if technicians left things alone	2.07	2.15	2.77	3.00
9	Does not desire to improve his business	2.50	2.66	2.83	3.00

(Table continued on next page)

Item No.	Item	Atomistic Retailers	Neighborhood Retailers	Self-Service Retailers	Largest Six Retailers
10	Index of managerial talent	2.30	2.50	2.79	3.00
11	Does not like to receive technical assistance	2.62	2.70	2.89	3.00
12	To earn more it is better to be lucky than to understand business	1.97	2.30	2.69	3.00
13	Index of interpersonal trust	1.84	1.63	1.77	2.11
14	It is not possible to have same trust in family and friends	1.57	1.36	1.63	2.33
15	We should not be partners with non-family	2.46	2.26	2.54	2.67
16	One can lose lots of money trusting others	1.49	1.26	1.14	1.33
17	Index of modernity (Items 1, 2, 3, 5, 6, 7, 8, 9, 11, 12, 14, 15, 16)	1.85	1.96	2.29	2.65

SOURCE: SUDENE/MSU Retailer Survey (1967).

market which, through management skill, not only actively adapts to its environment but, through its decisions, changes its environment to achieve increased market participation.

It is not hard to understand why the large retailer can be more adaptive when his credentials as a decision-maker and the scope of his assets are considered. Generally, the larger the retailer, the more literate and educated he was, the greater his salary, and the greater his assets in terms of selling space, fixtures and equipment, and inventory. Hence, the larger retailers simply have more opportunity and more alternative ways to influence their environment. They are also more willing to use their resources to better their businesses. The poor may not have this opportunity, as their families need basic food and shelter. Further, the larger the retailers, the greater are the number of professional managers and the higher the pay scale for both managerial and employee talent. The scale of operation clearly allows superior management and employees.

Large retailers perceive a competitive environment which leads to pricing below market price and trying to sell for less than others of the same type. It is important to understand the role of competition, as it is the key to moving the system forward. The differences between the extremes of the spectrum are not clear at first glance because most retailers do not price at the same level as their competition and if they buy for less, they sell for less. On the other hand, it has been pointed out that the larger the retailer, the more he uses price to attract customers and the more he attempts to price lower than others. Thus, the atomistic retailer end of the spectrum is less affected by competition than the large retailers who are very conscious of competition and compete on a price basis. Hence, one end of the spectrum is passive, while the other is a dynamic change agent through competitive forces.

The large end of the retail spectrum also tended to buy more often on a price and quality basis than the small end. Thus again, larger retailers seem to have more competitive practices than the smaller retailers.

Finally, the preceding analysis leads to the conclusion that the larger retailers are more innovative in their practices. The index of innovation demonstrated this to be so.

The actual value of a type of retail institution to a society is not entirely measurable due to the differences in functions that the retail institutions perform. The major specialized functions of the retail institutional types were as follows: the major function

of the street fairs is to provide a mix of perishable products; neighborhood stores furnish time, place, and credit convenience; and self-service stores supply a wide product mix at low prices.

On the other hand, if simple economic criteria are used, some value judgments can be made. The evidence that size leads to a more rational system of distribution lies in the retail prices, growth rates, spoilage and innovative aspects of the large retailers compared to the rest. Although supermarket operations in Recife do not yet carry a full line of perishables and dry products, some retailers are approaching this breadth of line. What presently exists is large store size, self-service selling, better handling of goods, and some volume buying. However, Recife supermarkets and self-service stores still lack efficient stocking and inventory control, vertical integration, full product lines (including meat and produce), full commitment to the high volume, low margin philosophy of selling, and a full commitment to margin mixing. Even recognizing that the present self-service retailers are far from the ideal, the larger retailers have made significant strides, as evidenced by lower prices.

The analysis of perceived barriers further supports the notion that small retailers have less control over their environment and thus see more barriers as limitations on their operations. Further, the small retailer saw competition as relatively less important than other barriers in comparison to the position taken by larger retailers, which supports the conclusion that they react less to the forces of competition than do the larger retailers.

In terms of internal attitudes about the system in which they operate, the smaller the retailer was on the continuum, the more he was bound by his family size and location, belief in fate, social control, and lack of aspiration. These factors lead to the conclusion that the larger retailers have the ability to change through the use of talent and resources, the motive to change in terms of a sense of competition, the perception that they can change relative to their environmental limitations, and the internal predisposition to change.

The answers to the questions posed in this chapter are clear. The smaller the retailer on the spectrum of retailers, the more his production responses are blocked by both the system which he is in and his own inability and constraints, the one feeding on the other and the combination causing marketing constraints on other channel members. It is evident that these operators would tend to resist

change and would not react to change by themselves. To emphasize this point, the street fair retailers were asked what they would do if a supermarket opened near them and attracted one-half of their customers. Over half (60%) said that they would do nothing, 3% would go out of business, 1% would complain and protest, and 3% would attempt to compete and win back their customers. Meaningless or irrelevant answers were given by 17%. The results of this question give an indication of the plight and reaction of the small retailer. In essence, 93% of the street fair operators would do practically nothing competitive as a reaction to a phenomenon which has already started to occur in Recife.

Thus, the atomistic retailer is a relatively inert market operator who does little reacting or decision-making that influences his economic environment. The atomistic retailers do not seem to realize that their traditional system is in jeopardy from competitive changes. This lack of realism reinforces the notion of these retailers as dependent decision-takers.

As noted in the chapter on Recife consumers, the competitive phenomenon has been brought about by the advent of the self-service retailer. The self-service retailer has been contrasted with the other retailers in this chapter to demonstrate the basic differences that exist in the retail structure. It is evident that the major portion of the self-service stores do not constitute an overwhelming revolution in retailing, yet they are one step removed from the traditional system of retailing in Recife. However, a few retailers were forces of change willing to exert their influence on their environment. These firms were decision-makers who were large enough to influence market conditions and who had the inclination and talent to do so. Thus, before analyzing the changes that are needed to achieve a more efficient distribution system, it is of interest to view the lead edge of the self-service change, the retail change that does constitute a revolution--the inception of a true supermarket system in Recife.

Because the changeability of the self-service retailer has been presented relative to the other types of retailers does not mean that the others should not play a part in the changing retail structure. As the major retail structures, the atomistic and neighborhood retailers cannot be written off so easily, nor should they be. What is important is that intervention from outside these structures is necessary if change is to be constructive within these retail types. The force for change will not likely come from within these systems.

Wholesale Distribution

The Urban Wholesale System for Foods

The structure of the wholesale system for food is denoted by the places where retailers buy their products. As has been presented, retailers have four major sources of supply for foods. First, they buy from the interior at some point in the assembly system. These suppliers are not urban wholesalers and will be dealt with in a later chapter. Second, retailers buy from compartment- or stall-located wholesalers, the majority of which reside in the Santa Rita public market and the Afogados fixed fair. Third, retailers buy from independent wholesale establishments at various locations throughout Recife. Finally, they buy direct from producers, processors or manufacturers, bypassing the wholesaler entirely. The remainder of this chapter will present a descriptive analysis of "compartment wholesalers" and "established wholesalers."

Compartment Food Wholesalers

Urban "compartment wholesalers" are defined as urban channel members who sell at least 1/4 of their volume to other businessmen and who are located in a group mix with many other retailers and wholesalers. Although there are some compartment wholesalers scattered throughout the various public markets and fixed *feiras* presented in the retailer chapter, 71% of all compartment wholesalers are located in either the Santa Rita public market or the Afogados fixed *feira* (about 3/4 [76%] of these are located in the Santa Rita public market). Because of this concentration in two markets, a special survey was made of these wholesalers. In preparation for drawing a sample of these wholesalers, a census was made which revealed that there were 76 wholesalers in Santa Rita and 23 in the Afogados fixed *feira*.

The findings presented in this section are based on a survey of 66 compartment food wholesalers in these two markets. The survey was made in July of 1967. Sixty-two of the respondents (94%) were actually the owners of the businesses interviewed, while 4 (6%) were managers.

Established Wholesalers

"Established wholesalers" are defined to include those businessmen who sell at wholesale from permanent places of business

within a building that is not part of a street fair, public market or fixed fair. Only those established wholesalers who handle food are included in this population. There exists no complete listing of this population, and a census was out of the question due to the difficulty of locating these wholesalers. Thus, an approximate population was built using lists from the Wholesalers' Union, the tax authorities, the banks, and Dunn and Bradstreet. The result was a preliminary list of 157 established food wholesalers. When this list was used for a 3/4 sample, it was found that 35% of these businesses were closed, were not food wholesalers, or never existed. Thus, the size of the population used was 102. No claim is made that this is an accurate listing of the population, but the list is reasonably complete. Because wholesalers are going out of business rather rapidly, there is little danger of not including a large segment of new entrants. There is some danger, however, of omitting some small wholesalers.

The findings presented in this section are based on a survey of 70 established wholesalers in Recife made in May and June of 1967. Sixty-four of the respondents (91%) were actually the owners of the business, while 6 (9%) were employees.

Demographic Characteristics

A brief summary of the characteristics of the decision-makers sets the stage for the analysis of these wholesalers and gives an indication of their trained capability. The mean age of compartment wholesalers was 38 years, while the mean age of established wholesalers was 39 years. Forty-five percent of the compartment wholesalers said they could read; but only 47% of these could read easily, and 13% could not read at all when tested. On the other hand, 83% of the established wholesalers claimed literacy, and 92% of them could read easily when tested. On the average, compartment wholesalers had completed 1.6 years of school, with 49% having had no schooling at all and only 11% having reached beyond the fourth year (primary school). On the average, established wholesalers had completed 6.9 years of school, with 81% having had more than four years of school (primary) and 33% having completed more than nine years (junior high school). Ten percent had attended a university. Of all compartment and established wholesalers, 83% and 89%, respectively, did not have other jobs. On the average, those with second jobs spent 6 and 14 hours on these jobs per week, respectively. The mean number of dependents supported by each compartment whole-

saler was 6.6 and was 7.2 for the established wholesalers. The average number of years as a wholesaler for compartment wholesalers was over 10, and the average for established wholesalers was 13 years. The established wholesalers were thus more literate and educated than the compartment wholesalers.

Structural Characteristics of Recife Wholesalers

Before analyzing the behavior of the various wholesalers, it is useful to understand the structural, technical and physical characteristics of these wholesalers. Table 5.24 presents a description of the structural characteristics of the wholesalers in

Table 5.24 Physical Characteristics of Food Wholesale Units by Wholesaler Type

Characteristics	Compartment Wholesalers	Established Wholesalers
Number of Wholesalers	139	102
Ownership of Business		
% Individual proprietorship	80	46
% Family business	6	3
% Partnerships	12	37
% Corporations	2	9
% Other	0	5
% Location ownership (by store)	0	29
Mean Size ($m.^2$)	4	214
Mean Asset Value of Building Regardless of Ownership:		
NCr$	200	10,700
(US$)	(74)	(3,960)
Mean Value of Fixtures and Equipment:		
NCr$	N.A.	39,088
(US$)		(14,477)
Mean Inventory on Hand:		
NCr$	413	91,000
(US$)	(153)	(33,700)

SOURCE: SUDENE/MSU Wholesaler Survey (1967).

Recife. Like the atomistic retailers, compartment wholesalers were mostly individual proprietors, while the larger (established) wholesalers were divided between individual proprietorships and

partnerships. By definition, none of the compartment wholesalers owned their locations of business, yet surprisingly few (29%) of the established wholesalers owned their places of business. Like the atomistic retailer, the facilities of the compartment wholesaler were small, though the facilities of the established wholesaler approached the size of the mean for the self-service store. The established wholesaler was vastly bigger than the compartment wholesaler in terms of assets, and again resembled the mean self-service store. Most compartment wholesalers (86%) operated from one compartment, only 44% had scales, and only 48% had any hand tools.

Table 5.25 shows the labor characteristics of Recife wholesalers. It is interesting to note that compartment wholesalers are much like atomistic retailers in their labor use, except that they pay higher salaries in all the categories. Likewise, the established wholesalers are somewhat like the self-service retailers, but they use less labor and pay higher salaries. Clearly, the owners and managers of the established wholesalers as a group

Table 5.25 Labor Characteristics of Food Wholesalers by Wholesaler Type

Characteristics	Compartment Wholesalers	Established Wholesalers
Total Persons in Business Type	256	634
Mean Persons per Business	1.84	6.22
Mean Owners per Business	1.14	1.46
Mean Work Week (hours)	79	54
Mean Weekly Salary		
NCr$	71.34	211.36
(US$)	(26.42)	(78.28)
Mean Managers per Store	.06	.24
Mean Work Week (hours)	76	53
Mean Weekly Salary		
NCr$	26.25	179.25
(US$)	(9.72)	(66.39)
Mean Other Employees per Store	.64	4.52
Mean Work Week (hours)	73	50
Mean Weekly Salary		
NCr$	17.55	36.22
(US$)	(6.50)	(13.41)

SOURCE: SUDENE/MSU Wholesaler Survey (1967).

make by far the best living of any of the urban distribution system members.

The mean number of years that the compartment wholesaler had been in his present location was 5, while the established wholesaler had an average of 9. Typically, the wholesalers operated only one location, with 89% of the compartment wholesalers doing so and 84% of the established wholesalers being in this category.

Table 5.26 demonstrates that, like the retailers, the small compartment wholesalers handle primarily highly perishable fruits and vegetables, while the established larger wholesalers handle

Table 5.26 Percent of Wholesalers by Type Carrying Various Commodities

Commodity	Compartment Wholesalers	Established Wholesalers
Rice	2	59
Beans	0	31
Manioc flour	0	17
Dairy products (excluding liquid milk)	0	63
Meat other than fresh meat		53
Bananas	24	0
Other fruits	48	3
Tomatoes	8	0
Other vegetables (onions and potatoes only)	44	(33)
Canned foods	0	46
Other	6	13

SOURCE: SUDENE/MSU Wholesaler Survey (1967).

cereals, processed foods and canned goods. Thus, one segment of the wholesale structure is very much like the retail structure, with small, poorly financed units employing few beyond themselves and their families, paying low wages, and handling perishable products. The one striking feature of the established wholesalers is the relatively high owner and manager salary level compared to the rest of the urban distribution system.

Wholesale Practices and Decision Rules

Customer-related Practices and Decision Rules

Pricing practices are an important area related to the thesis developed in Chapter 1. The relevant question is, if input prices to the wholesaler are lowered either by prior channel members or through the wholesaler's own efforts, will he pass his savings on to his customers?

Sixty-four percent of compartment wholesalers and 70% of established wholesalers reported that they did not try to sell for the same price as their competitors, but only 17% and 30%, respectively, reported that they generally sold at lower prices. Only 36% and 37%, respectively, used price to attract customers. Further, of compartment and established wholesalers, 88% and 89%, respectively, responded that if they bought products at lower prices than their competition they sold them for less. Clearly, these wholesalers priced on a fixed margin.

It is of interest to note the differences between wholesale and retail prices of compartment units, as most sell both at retail and wholesale. Tomato and banana wholesalers serve as an example. Thirty-five percent of these wholesalers did not have different prices, 25% had differences of 1-3%, 15% had differences of 10%, 15% had differences of 20%, and 10% had greater differences between wholesale and retail prices than 20%. The average difference was 9%.

All of the wholesalers said that they sometimes lowered prices to sell products before they spoiled. Like the atomistic retailers, 86% of the compartment wholesalers sorted their products by quality; but surprisingly, 70% of the established wholesalers did so also. Finally, only 20% and 16%, respectively, of the compartment and established wholesalers thought other wholesalers like themselves cheated.

Supply-related Practices and Decision Rules

Another important area concerns where wholesalers obtain their supply. The answer to this question sheds light on the kind of channel which reaches back to the rural area and the importance of the supply from southern Brazil. Tables 5.27 and 5.28 present the sources of supply where compartment and established wholesalers buy their stocks of products.

The kind of channel proliferation mentioned in Chapter 1 is demonstrated by compartment wholesalers, who buy much of their

supply from other compartment wholesalers in Recife. The balance comes from the interior of the Northeast. In the case of the established wholesaler, southern Brazil and the interior form the major supply sources. Little comes from other wholesalers.

Table 5.27 Sources of Supply of Selected Commodities for Compartment Wholesalers

Commodity	Wholesaler Santa Rita	Wholesaler Afogados	Interior	Other	Total
Bananas	19%	6%	56%	19%	100%
Tomatoes	20%	40%	40%	0%	100%
Other Fruits, Vegetables	31%	10%	31%	28%	100%

SOURCE: SUDENE/MSU Wholesaler Survey (1967).

Table 5.28 Sources of Supply of Selected Commodities for Established Wholesalers

Commodity	Wholesaler Center City	Rio Grande do Sul	*Feira* and Public Market	Interior	Other	Total
Rice	16%	74%	0%	10%	0%	100%
Beans	14%	23%	4%	45%	14%	100%
Manioc Flour	0%	17%	8%	75%	0%	100%

SOURCE: SUDENE/MSU Wholesaler Survey (1967).

The transaction conditions for these wholesalers are presented in Table 5.29. The compartment wholesalers were again much like the atomistic retailers in that they used significant amounts of credit for short periods of time at high costs. More established wholesalers responded that they used credit than did the self-service retailers, though they paid more for it and took longer in repayment.

Table 5.29 Number of Suppliers and Amount of Credit Given to Compartment Wholesalers for Selected Commodities

Commodity	Mean Number of Suppliers	% Who Trans. by Volume			% Who Made Last Purchase on Credit	Pay-Back Period (Days)	Annual Cost of Using Credit
		None	Some	All			
Compartment Wholesalers:							
Bananas	1.4	35	8	57	31	6.2	290
Tomatoes	2.6	100	0	0	40	8.0	562
Established Wholesalers:							
Rice	2.6	31	13	56	56	50	24
Beans	2.4	52	5	43	14	38	59
Manioc flour	2.0	33	8	59	25	26	42

SOURCE: SUDENE/MSU Wholesaler Survey (1967).

On the average, over half of the established wholesalers arranged for incoming transportation. On the other hand, compartment wholesalers arranged over half of their incoming banana transportation, but did no transporting of tomatoes.

Finally, wholesalers tended to use more suppliers than retailers, yet 65% of the compartment wholesalers and 84% of the established wholesalers used the same group of suppliers. Two-thirds of the compartment wholesalers (67%), like the atomistic retailer, obtained prices from more than one supplier before buying, while 81% of the established wholesalers did so. Of these wholesalers, 85% and 81%, respectively, always tried to buy the same quality and 91% and 81%, respectively, felt that their colleagues could evaluate quality.

The most important reasons why compartment and established wholesalers preferred the suppliers that they used were trust and friendship (27% and 31%, respectively), quality-price relationship (26% and 21%, respectively), quality only (14% and 17%, respectively), credit (18% and 16%, respectively), price only (14% and 14%, respectively), and punctual good service (9% and 11%, respectively). Personal trust and friendship seemed important, while good service was not important. Price and quality considerations were not of the first level of importance. Few wholesalers of the two categories, 20% and 10%, respectively, purchased on price only, without

regard for quality. Good, punctual service was considered by wholesalers as unimportant, while retailers considered it important. Most of the wholesalers in the two groups, 62% and 66%, respectively, reported that their suppliers gave discounts to regular customers. Of the compartment and established wholesalers, 80% and 71%, respectively, felt that their suppliers made large profits when supply was short. Further, 73% and 64%, respectively, felt that their suppliers always sold products for the highest possible prices. Hence, somewhat fewer established wholesalers than compartment wholesalers seemed to feel that their suppliers took advantage of them.

When asked if they could sell all that they could afford to buy, 65% of the compartment wholesalers indicated that they used their resources for stock, while 39% of the established wholesalers did so. Further, when these wholesalers were asked if they tried to buy enough to satisfy all demand, 88% of the compartment wholesalers and 94% of the established wholesalers indicated that they did.

Communications-related Practices and Usage

Though no wholesalers advertised to their customers through the mass media, it is of interest to examine the ways that communication does take place in the channel. Sixty-five percent of the compartment wholesalers and 74% of the established wholesalers said they told their suppliers what products their customers wanted. Likewise, 70% and 77%, respectively, responded that most of their suppliers tried to offer the products that they wanted. Eight percent of the compartment wholesalers as compared to 31% of the established wholesalers said they got their price information from their suppliers. Fifty-nine percent of the compartment wholesalers did not receive newspapers or magazines regularly and 49% had not read a newspaper or magazine lately. On the other hand, 90% of the established wholesalers did receive newspapers and magazines regularly and read them. Of the compartment and established wholesalers, 83% and 97%, respectively, reported owning a working radio, but 77% and 66%, respectively, reported listening to a radio infrequently or never. Almost half of the compartment wholesalers (49%) never watched television. Twenty-one percent watched television occasionally outside the home and 30% watched television at home. On the other hand, 87% of the established wholesalers watched television regularly at home. The compartment wholesaler, like the atomistic retailer, did not have

broad mass media exposure, while the established wholesaler had substantial exposure to all the media.

Practices and Decision Rules Related to Business Operation

There are large differences between the two types of wholesalers in their efforts to cooperate with wholesalers like themselves. Of the compartment wholesalers, 27% belonged to a union or association, while 54% of the established wholesalers did. Further, 49% made no arrangements with other compartment wholesalers as against 73% of the established wholesalers.

Respondents were asked what they would do with a sum of money equal to one year's earnings if they had saved it during the past few years. Fifty-eight percent of compartment wholesalers and 69% of established wholesalers said that they would invest all or part of that sum in improving their present businesses.

Finally, the wholesalers were asked several questions to determine their willingness to adopt new practices. Of compartment and established wholesalers, 12% and 79%, respectively, responded that they marked prices on their commodities; 42% and 47%, respectively, said they tried to sell products that were new on the market; and 61% and 84%, respectively, reported protecting their products from natural elements, rats or insects. When these items were grouped into an index with 1 equaling no adoption and 3 equaling complete adoption, the average adoption was 1.8 and 2.4, respectively, indicating that the established wholesalers are more willing to change than are the compartment wholesalers.

Conclusions

This section has described the behavior and practices of compartment and established wholesalers. Both tended to price on a fixed margin. Few used price to attract customers or maintained generally lower prices than other wholesalers. On the other hand, most did price according to the quality of their stock and did sort their stocks by level of quality. It is evident that wholesalers did not feel that they could gain by pricing at lower prices than competition to the extent that the self-service retailers did. As with the atomistic retailers, compartment wholesalers tended to use short-term, high-cost credit, while established wholesalers used much lower-cost credit. The compartment wholesaler typically was not exposed to the mass media; the established wholesaler was

exposed to all the media in significant proportions. Finally, though more compartment wholesalers were willing to reinvest in their businesses than were the atomistic retailers, established wholesalers were willing to reinvest in about the same proportions as the self-service retailers.

Performance Characteristics of Food Wholesalers

Before turning to measures of performance, it is necessary to understand who the wholesalers serve and what functions they perform.

Functions and Services Performed by Wholesalers

Earlier analysis indicated that retailers bought in substantial numbers from compartment and established wholesalers. However, these are not the only customers that wholesalers have (Table 5.30). Compartment and established wholesalers served the same kinds of customers, except that the established wholesalers had more self-service retailer and wholesaler customers.

Table 5.30 Percent of Compartment and Established Wholesalers Selling to Different Customer Types (% given 6 responses)

Customer Type	Compartment Wholesalers	Established Wholesalers
Self-service retailer	32	61
Feirantes	99	90
Other retailers	83	88
Wholesalers	28	53
Restaurants, bars, and hotels	41	48
Others	26	31

SOURCE: SUDENE/MSU Wholesaler Survey (1967).

Most compartment and established wholesalers felt that their customers were price-quality knowledgeable. Ninety-one percent and 93%, respectively, felt that their customers knew the prices of the same products in other places; 91% and 84%, respectively, thought that their customers shopped around for best quality; 97%

of both groups responded that their customers bargained; and 96% and 100%, respectively, said that their customers knew the qualities that they sold. Further, 94% and 80%, respectively, felt that their customers wanted to buy the same quality each time of purchase. Finally, 74% and 76%, respectively, felt that customers thought quality was more important than price.

Some of the functions that wholesalers perform have been indicated previously. These functions are the transactional, bulk-breaking and transportation functions. Other wholesaler functions are presented below.

Forty-eight percent of the compartment wholesalers gave no credit, while 24% did one-fourth, 17% did one-half, and 11% did three-fourths of the wholesale volume on credit. Eleven percent reported that they made some deliveries to their customers' places of business.

Fifty-three percent of the established wholesalers gave no credit, while 5% gave 1-30% of their customers credit, 14% gave 40-60% of their customers credit, and 19% gave 70-90% of their customers credit. Nine percent gave all of their customers credit. Twenty-six percent reported that they delivered some sales products to their customers' places of business.

Wholesalers in both categories performed a few other functions. Of compartment and established wholesalers interviewed, 12% and 14%, respectively, reported that they did some processing (such as cutting, trimming, etc.); 8% and 7%, respectively, said they also produced some products; 9% and 14%, respectively, said they were brokers; 3% and 16%, respectively, said they were warehousers; and 0% and 47%, respectively, reported making imports from outside the country.

Measures of Wholesaler Performance

Spoilage - As with retailers, spoilage is a very important indication of the performance of wholesalers. Compartment wholesalers handling fruits and vegetables have about the same spoilage rates as atomistic retailers handling the same products. The established wholesalers reported losses of staple foods (rice, beans and manioc flour) averaging between 2 and 4%, with additional financial losses due to product deterioration (Table 5.31).

Price Margins - As noted in the retailer chapter, spoilage rates for spoiled but salable commodities reduce the margins between the actual selling price at any given time and the cost of

Table 5.31 Spoilage of Selected Products Carried by Wholesalers

Commodities	% Spoilage Salable	% Spoilage Unsalable
Compartment Wholesalers:		
Bananas	19.56	11.19
Tomatoes	13.00	11.00
Established Wholesalers:		
Rice	6.24	2.49
Beans	13.71	2.77
Manioc flour	10.25	3.67

SOURCE: SUDENE/MSU Wholesaler Survey (1967).

those goods. Hence, the greater the spoilage, the smaller the margin reported. Thus, margins are difficult to compare, but do give some order of magnitude as to the costs of wholesale operations (Table 5.32).

Table 5.32 Price Margins by Selected Commodities for Wholesalers

Commodities	Margin as a Percent of Selling Price
Compartment Wholesalers:	
Bananas	20%
Tomatoes	18%
Established Wholesalers:	
Rice	9%
Beans	13%
Manioc flour	17%

SOURCE: SUDENE/MSU Wholesaler Survey (1967).

Limitations of Wholesale Food Marketing in Recife

The next step in this analysis is to see how the wholesalers are constrained by their perceptions of their environment and their internal predispositions or notions of how the world operates. These two kinds of barriers have been called external and internal barriers, respectively, in the retailer section of this chapter, and will be carried forward here for wholesalers.

External Barriers

Both compartment and established wholesalers tended to agree on most of the barriers. On the over-all index of barrier agreement (with 1 equaling complete agreement and 3 being complete disagreement about which barriers were important), both types of wholesalers registered an average of 1.7. Further, out of 21 barrier questions, the compartment wholesalers saw 4 (19%) as being less important on the whole, while the established wholesalers saw only 2 (10%) in this category. Thus, these wholesalers react to their environment very much like the atomistic retailers do. It is interesting to note that 15% of the compartment wholesalers and 21% of the established wholesalers did not desire to expand their businesses. Again, some of these wholesalers do not show a competitive spirit or a feeling that they can control their success. The following analysis of barriers reinforces this conclusion.

Table 5.33 presents the relative importance of the various barriers as they relate to expansion by the respondents. The lack of financial resources is clearly the major problem for both types of wholesalers, with lack of demand being second. It is interesting to note that the larger established wholesalers felt that lack of demand was important in greater proportions than did compartment wholesalers. Finances were considered important by fewer established wholesalers. Neither type viewed competition as important.

Table 5.34 shows the same two problems as important when related to profits but less so than before. For the compartment wholesalers, the cost of products, the lack of supply, and competition increased slightly in importance, while the cost of products seemed to gain a great deal of importance for the established wholesalers.

Table 5.35 presents individual reactions to expansion barriers. Here, each barrier was mentioned individually and the respondent indicated whether or not it was very important. The lack of regular

Table 5.33 Perceived Relative Importance of Barriers to Expansion by Wholesaler Type (in percent)

First responses and total of three responses. The most important problems preventing expansion.	Compartment Wholesalers		Established Wholesalers	
	First	Total	First	Total
Lack of money	76	84	53	57
Lack of sales	16	25	21	36
Poor location	0	2	0	8
High product prices	2	2	2	11
Lack of supplies	0	5	2	2
Too much competition	0	0	2	8
Government laws	2	2	8	9
Other	4	18	12	19

SOURCE: SUDENE/MSU Wholesaler Survey (1967).

Table 5.34 Perceived Relative Importance of Limitations on Profits by Wholesaler Type (in percent)

First responses and total of three responses. The most important problems preventing higher profits.	Compartment Wholesalers		Established Wholesalers	
	First	Total	First	Total
Lack of money	33	38	30	34
Lack of sales	32	48	20	31
Poor location	0	3	0	1
High product prices	8	14	21	31
Lack of supply	8	11	6	11
Too much competition	6	12	1	4
Government laws	0	3	9	10
Other	13	21	13	17
	100%		100%	

SOURCE: SUDENE/MSU Wholesaler Survey (1967).

customers was regarded as important by most of the wholesalers, especially established wholesalers. Though the lack of ability to get a loan and the cost of loans were considered important by both types of retailers, compartment wholesalers placed more importance on the ability to obtain loans, while established wholesalers saw cost as more important. Further, it is noteworthy that greater proportions of the established wholesalers (62%) than other wholesalers

(25%) or retailers saw the threat of government change as important. This reflects the fact that the established wholesaler is being bypassed due to changes in the laws governing channel activities. Because of such changes, more and more manufacturers are selling directly to retailers, causing a decrease in use of wholesalers. Thus, importance is consistently placed on demand as a barrier, although these operators are large. The major function of the established wholesaler is being performed elsewhere in the system, and the established wholesalers feel the effects. Though the established wholesalers experience the lack of customers, they, like the compartment wholesalers, do not consider competition relatively important.

Table 5.35 Perception of External Barriers to Expansion Held by Wholesalers Who Desire to Expand by Wholesaler Type

Of those who desire to improve, the percent who feel one of the most important reasons preventing their expansion is:	Compartment Wholesalers %	Established Wholesalers %
Lack of ability to obtain loan	80	62
Lack of regular customers	87	94
High cost of borrowing money	71	75
Difficulty of finding good location	75	62
Irregular supply of products	67	77
Danger of floods	58	57
General increase in competition	49	58
Risk of changes in current policy and laws	25	62
Do not desire to improve	15	21

SOURCE: SUDENE/MSU Wholesaler Survey (1967).

Table 5.36 presents the proportions of respondents who felt that various barriers to profits were important. Various operating problems became important when profits were considered. It is interesting that the established wholesalers feel that competition limits their profits along with demand conditions.

In summary, the compartment wholesaler perceived his environment much as did the atomistic retailer. On the other hand, the established wholesaler perceived his barriers as being greater in number and more severe than self-service retailers did, with a greater emphasis on demand problems. Both types of retailers tended to give considerably more weight to demand problems than to

supply problems when given the opportunity to freely choose the most important barriers.

Table 5.36 Perception of External Barriers to Profit by Wholesaler Type

The Most Important Reasons Limiting Profit	Compartment Wholesalers %	Established Wholesalers %
Varying prices	89	71
Product spoilage	92	89
Varying quantities of customer purchase weekly	80	70
Competition	67	81
Irregular supply of product	67	74
Lack of information about price	53	56
Lack of information on quantity of products available	46	53

SOURCE: SUDENE/MSU Wholesaler Survey (1967).

Internal Barriers

As was done in the retailer section, some of the beliefs and attitudes of the wholesalers were summed into indices with 1 representing agreement with a traditional value and 3 representing agreement with a modern value. Table 5.37 presents the averages of these indices and attitudes by wholesaler type. In comparison with compartment wholesalers, established wholesalers were less affected by social sanction on success, less locationally affected by family, and less influenced by a belief in fate.

The large wholesalers were only slightly more trustful and only a little more managerially-oriented than the compartment wholesalers. Though somewhat smaller proportions of the established wholesalers wanted to improve their businesses as compared to the compartment wholesalers, they tended to be more modern than compartment wholesalers.

Compartment wholesalers are about as modern as atomistic and neighborhood retailers, while established wholesalers are more modern than these retailers but less modern than self-service retailers. The wholesale system which services the traditional retail system is also, as might be expected, largely traditional in its viewpoint.

Table 5.37 Internal Barriers by Wholesaler Type		
Item	Compartment Wholesalers	Established Wholesalers
1. Neighbors do not want you to prosper	1.65	1.86
2. Desire to live near family	1.35	1.93
3. Index of fatalism	1.77	2.11
4. Index of interpersonal trust	1.77	1.83
5. Index of managerial talent	2.32	2.42
6. Desire not to improve his business	2.70	2.56
7. Index of modernity	1.77	2.02

SOURCE: SUDENE/MSU Wholesaler Survey (1967).

Summary and Conclusions: Wholesale Distribution

The purpose of this section has been to present the nature of the urban wholesaler in an attempt to define his role in the food distribution system as well as to study the questions formulated in the beginning of the chapter. Clearly, compartment wholesalers are much like atomistic retailers in almost every detail, and thus the conclusions made for the atomistic retailers are fitting here as well. In essence, then, compartment wholesalers do not have the scale of operation nor the resources to change their environment and thus continue to operate in the traditional distribution system. This causes distortions which force the consumer to pay more for lower quality products and forces prior channel members to operate with greater risks in terms of price fluctuations, spoilage loss, etc.

Unlike large retailers, established wholesalers do not seem to follow the same competitive practices and are thus not using their size and financial resources to gain competitive advantage. Rather, these large wholesalers are facing a decreasing demand for their services with little positive reaction. Though wholesalers who had already gone out of business were not included in the sample, several were encountered in the self-service retail business. This shift indicates a possible means of employing the established wholesalers to gain the use of their resource and sales volume

power as well as their managerial talent. The shifting of the more adaptable of these businesses into the retail self-service business would place these units in a more competitive atmosphere where the use of their ability would be encouraged and their knowledge as wholesalers could aid in bringing about vertical integration.

CHAPTER 6

THE URBAN FOOD MARKETING SYSTEM-- CONCLUSIONS AND RECOMMENDATIONS

The largely traditional urban food distribution system described in Chapter 5 is beginning to change in two ways. The first change is that which started at the retail level with the introduction of self-service stores and evolved into large-scale food retailing. The second is the change in the wholesale structure which has been introduced by SUDENE through reforms of the urban wholesale market system. It is necessary to look at the implications of these changes to see how they might be guided and reinforced. This chapter will deal first with the retail change, secondly with the wholesale reform, and finally with one set of recommendations which flows from the analysis.

The Spontaneous Evolution of Large-Scale Retailing

Though a comparison of self-service retailers to the rest of the retailers has been made, it is useful to summarize the differences which emphasize that the largest retailers are the lead edge of this change.

The evidence presented in Chapter 5 indicates that there is a substantial distance between the mass of traditional system operators (7,800) and the few (6) largest retail operations, which will be referred to as supermarkets. Whereas traditional operators are stagnant or decreasing in volume, supermarkets are expanding rapidly. Also, their per unit size (mean: 465 square meters) is 22 times that of neighborhood stores and 155 times that of atomistic retailers. In terms of sales, the supermarket mean (NCr$81,333 per week) is 116 times that of the neighborhood store average and 153 times that of the atomistic retailers' average sales. The relative per unit impact of supermarkets versus traditional units is great.

A second variable in which supermarkets are leagues apart from traditional retailers is in their ability to change. Evidence of this not only is definitional--supermarkets <u>are</u> a change--but also is shown by the indices measuring change. Supermarkets' practices are innovative, while traditional retailers' are not. These six largest retailers also feel that they have the

resources to change within their environment, whereas the traditional retailer feels oppressed by his environment and powerless to take the initiative to change. These may be very rational reactions, given the size and the technology which the traditional retailer has at his disposal. Further, the traditional retailers are more susceptible to non-economic forces in the system. These small retailers are more restricted by family location, by their peers, by their fatalistic attitudes and lack of trust in others than are the larger retailers.

Thus, clearly, these large retailers are not bound by the constraints that tie the traditional operator to his traditional system. Supermarkets are freer to change and do change. That is to say, supermarkets are free to act in relation to competitive forces, whereas environmental, financial, non-economic variables preclude the small unit from responding to competition.

Finally, large self-service operators will reinvest in their business, while atomistic retailers will generally not reinvest, and only three out of five neighborhood retailers would.

Along with the willingness to change, supermarket operators have the ability to manage the change. They are literate, educated and possess managerial skills, whereas traditional operators are largely illiterate, uneducated and lacking in managerial skill.

The payoff of the supermarket change can already be seen. The prices of these retailers are generally lower for better quality than those of the rest of the system. The supermarkets have lower spoilage and credit costs than the traditional operators.

Supermarkets buy directly and in larger volumes, thus having a lower cost of goods. Because supermarkets are sensitive to competition, they tend to pass the benefits of their competitive advantage on to the consumer in an attempt to grow and increase their share of the market. Their pricing policies reflect this fact. Most supermarkets reported that they tried to price below others in the same business, whereas traditional operators did not. Most supermarkets reported that they used low price as a competitive tool to attract customers; traditional operators generally did not.

Many economists argue that increasing scale away from that which pure competition theory would indicate as optimal leads to increasing monopoly power on the part of channel members, causing volume restrictions and increased prices. Though the atomistic channel members here do not meet all of the requirements of pure

competitors, the increase in scale of self-service stores has led to lower prices, greater volume and increased competition.

The following brief history of the self-service store in Recife stems from a special depth study. Unstructured interviews were made of most of the self-service stores and a sample of the non-self-service stores. The object of the study was to trace the competitive effects of the self-service innovation as it progressed from inception to the present time. Thus, it was necessary to isolate the change agents and then sample various types of retailers at various distances from the change agents to determine the spatial competitive effects of these change agents.

In the past ten years, self-service retailing has grown from nothing to its present size and importance in the Recife market. Approximately 11% of all food expenditures are now made in self-service stores. This rapid growth can be attributed to the needs of the small but growing middle class in Recife. For the first eight years of operation, the self-service stores were not characterized by a high volume, low price concept. Gross margins ran from 15 to 30%, with the mean around 23%. These operations were small and did no significant advertising or promotion. The years 1964 and 1965 brought the main expansion of Comprebem into self-service retailing with the construction of three supermarkets and the conversion of five smaller stores as well as many independent operators into self-service. On June 12, 1966, Bom Preço opened one large supermarket.

Until Bom Preço, all of the self-service operators, including Comprebem, seemed content with the high margin, no promotion philosophy. Thus, Bom Preço was the first to bring low margin, high volume practices into the Recife market. The repercussions of this innovation were felt in all corners of Recife. Volumes of other self-service and non-self-service retailers fell at the impact of the low prices and promotion of Bom Preço. More important, the high margins of the other self-service retailers rapidly decreased in the face of the lower margin competition. The mean margin decrease was 32%. The assumptions regarding these margins and volumes were obtained through a special study of the self-service stores.

It is important to note how the changes in margins were effected. Bom Preço entered the market with one large store. This was enough to cause Comprebem, a chain of eight stores in Recife, to lower its prices, causing a head-on price competition battle.

The fact that Comprebem lowered its prices forced the smaller independent self-service operators to follow suit. Table 6.1 shows the combined effect of Bom Preço and Comprebem on seven other self-service retailers. The owners and managers of the smaller supermarkets and *mercadinhos* almost unanimously stated that they had never felt the competition of Comprebem until Bom Preço opened. The effect of Bom Preço did not stop with self-service outlets. Around each self-service outlet, neighborhood stores were affected, the degree depending on their distance from the self-service outlet. Finally, some atomistic retailers in public markets and *feiras* were affected slightly, depending on their proximity to an important supermarket. Thus, a simple one-store innovation with a corresponding idea of high volume, low price selling forced the revolution of selling practices on competing food retailers. The effect of this change was to increase the real income of consumers through generally lower food prices.

A second benefit resulted from the advent of Bom Preço. Almost no promotion had been used until Bom Preço started a sustained advertising program using the mass media. Comprebem then reacted, causing smaller self-service organizations to react as well. The result was to draw even more people to the now relatively lower priced form of retailing, thus accelerating the benefits of lower prices in the Recife market.

One supermarket owner summed up the feelings of the majority of self-service operators when he confided that the opening of Bom Preço showed that their previous high margin, no advertising policy was not a viable and efficient way to run a supermarket.

Although the supermarkets of Recife cater directly to the upper and middle classes, the traditional outlets are affected by supermarket competition in varying degrees, indirectly benefiting the lower classes. As more retail units like the above-mentioned are introduced, the distances between these units will be reduced and the changes in the traditional units will be more pervasive. This pressure of supermarket operation sets the stage for a more rational system of distribution for all income levels.

Since the inception of Bom Preço there have been two prominent demonstrations of the use of retail power to rationalize the distribution system. First, though it was mentioned earlier that vertical integration had not yet taken place for agricultural non-processed foods, one striking exception exists. Bom Preço verti-

Table 6.1 Effect of Bom Preço on Margins and Volumes

Stores in Order of Size	Location Near Bom Preço/Comprebem	Gross Margin before BP	Current S.M.	% Fall in Margin	Immed. Fall-Sales	Current Sales Level
1	Comprebem	25%	12%	52%	20%	above former
2	Comprebem	20%	13%	35%	40%	above former
3	Comprebem	15%	15%	0%	0%	above former
4	Comprebem	20%	13%	35%	5%	above former
5	Comprebem	30%	25%	17%	15%	not recovered
6	Bom Preço	25%	18%	28%	30%	not recovered

SOURCE: SUDENE/MSU Special Retail Study (1967).

cally integrated its supply system for rice. This integration included the channel to an ownership of the rice milling operation in the production area. The evidence that integration resulted in lower prices for the consumer was presented in Chapter 5, Table 5.13. While other self-service stores were priced slightly above the system over-all mean price for comparable quality rice, Bom Preço was priced 12.8% below this mean for better quality rice. This is to say that Bom Preço was priced 15.4% below the other self-service stores sampled and sold better quality rice. These kinds of differences between Bom Preço and the self-service retailers did not show up for the other commodities to this extent. Thus it can be concluded that vertical integration enables Bom Preço to reduce the price of rice substantially and thus benefit the consumer.

The second demonstration of the use of aggregated retail power is quite different from the above vertical integration. In 1966 Comprebem found itself facing an intolerable supply situation for eggs. The only volume supplier of eggs for Recife was the poultry cooperative, which had gained a monopoly position in the distribution channel. The only other distributors of eggs were the very small traditional operators. The poultry cooperative started to use its power to extract relatively high prices from the larger retailers, who clearly could not generate the necessary volume from the traditional system in the short run. Comprebem met the threat head-on by organizing its purchases through one of the large cooperatives in the south of Brazil, more than 1,500 miles away. Comprebem claimed that they could buy the eggs, truck them north over the poor roads which were often dirt, throw out the broken eggs that resulted and still have a lower cost than if they bought them from the local cooperative. The loss of the Comprebem business to the cooperative caused a condition of over-supply which in 1967 forced the cooperative to reduce its prices to a reasonable amount. When this happened, Comprebem shifted its buying back to the local cooperative. The closeness of Comprebem to the market as a retailer and the competition between it and other retailers forced it to look for ways to bring the customer low prices. Thus, rather than accepting high supply prices from a supply system that did not feel the need to service the demand at low cost and did not have an environment of competition to force it to do so, Comprebem chose to fight the distortion in supply and had the scale to do so.

Thus, Recife is experiencing the beginning of change, the move from a traditional distribution system to one which brings food to consumers at lower prices. Clearly, this benefit is not only desirable in terms of increasing the real income of the consumer, but also has implications for area development through increased production fostered by increasing food and non-food purchases, i.e., demand has been expanded. Though change has just started, its power must not be underestimated. Zimmerman notes the following:

> In all we would find that man at a certain moment became aware of the necessity and the possibility of altering his environment; man became convinced that he could adapt society to fundamentally new conditions. It is this process of adaptation that we call economic development.[1]

Though this statement has been placed outside the context that Zimmerman had intended, it sums up the step that has been taken at the retail level in Recife.

There is undisputable evidence that a lead edge is causing change in the distribution system of foods in Recife. Further, these change agents are different from the rest of the operators in the economic system. Their limitations are different as well. Whereas the traditional distribution units have a myriad of internal and perceived external barriers to change, the supermarkets agree that the lack of financial resources and potentially available technical assistance are their major limitations on expanded market participation. A program of capital availability through development banking would consequently allow these change agents to extend their beneficial influence more rapidly, as well as encourage entry of potential change agents who are limited by their financial resource base. A training program would further increase the efficiency of the funds created by helping those interested compete more effectively.

The question now arises: What happens to the traditional marketing units as the supermarkets gain market share? Clearly, if left alone they will be forced further and further into desperation and poverty. The social cost of this result is high. Therefore, a counter-program to make these units competitive is needed. If these types of units are improved, the benefits accrue directly to the lower income consumers.

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[1] L.J. Zimmerman, *Poor Lands, Rich Lands: The Widening Gap* (New York: Random House, 1965), p. 131.

Thus, reforms in the traditional sector are desirable but the evidence presented in Chapter 5 indicates that these units are not easily changed. Hence, reforms can only be implemented as the change agents (supermarkets) force the traditional units toward extinction or the realization that the alternatives are change or die. At that point, a reform program could be implemented. As mentioned earlier, this is the point where the stage is set for change.

The less traditional small self-service and larger neighborhood stores already feel the competitive bite of the supermarket and the implied decision. They are ready to embark on a program of pooled market power. However, conditions of the very small neighborhood stores and the atomistic retailers have to deteriorate further before they recognize their plight. At that time, a program of pooled power could be beneficially implemented, but it must be ready when that time arrives.

The Wholesale Market Changes

The change at wholesale can now be viewed. Though the plans to foster production of food and non-food goods in the Northeast are many and varied, few programs have been developed for the urban distribution system beyond government controls such as taxes, margin control, buying and selling of stocks, etc. There is notably one exception to this lack of emphasis on the distribution channel which it is useful to report on before the recommendations of this research are presented.

During the year of April 1960 to April 1961, a French research team studied the distribution of foods and in 1962 presented their report to SUDENE. On November 22, 1962, based on the findings of this research, SUDENE created the Centrais de Abastecimento do Pernambuco, S.A. (CAPESA), the Center of Supply for the State of Pernambuco. On November 16, 1963, CAPESA was broadened to include all Northeast Brazil and was renamed Centrais de Abastecimento do Nordeste, S.A. (CANESA). The objectives of CANESA were to rationalize the food supply through the construction of three urban wholesale facilities which would be interlinked by radio with each other and with the various producing areas. These centers were to be in Salvador, Recife, and Fortaleza. Ideally, the producers could get daily reports on the urban marketing conditions at the three urban centers and contract the sale of their products via the CANESA communication system with the urban area.

At the urban side of this network, CANESA would build facilities for transacting business either directly (buyer and seller face to face) or indirectly through the communications system with the rural area. Hence, a producer could bring his products directly to one of these markets and find a place to sell them directly to the urban buyers, or he could, through the rural communications network, put his products up for sale given certified standards and sell to the highest bidder in one of the urban markets. Buyers are either wholesalers who reside in the market and sell from their permanent stalls or are retailers who frequent the market or who have permanent buying stalls. CANESA would also facilitate transportation of goods to the urban market by operation of a freight exchange. Pickups in the rural area would be coordinated with shipments in urban areas which were ready to be hauled to those rural destinations. Thus, efficient two-way hauling would be fostered, reducing the cost of waiting and one-way hauling that is now prevalent.

Each urban marketing center would include the following kinds of facilities:

1. Open buildings where producers of fruits and vegetables could rent space by the day to use for the sale of their products.

2. Buildings divided into compartments which larger producers, producer cooperatives, wholesalers, and large buyers could rent by the year for the buying and selling of fruits and vegetables continuously.

3. Buildings for the sale and storage of grains and cereals.

4. Silos for the storage in bulk of grains and cereals.

5. Large freezer and refrigeration storage areas for rental to the market users.

6. Facilities for various support functions such as a truck exchange, communication center, auction rooms, laboratory for research and testing for grading, bank, insurance agency, post office, sanitary and health services, hotel, administration offices, etc.

7. Supermarket for retail selling to the public, as no ultimate consumers would be allowed in the rest of the facilities.

The goal of rationalizing the system of distribution has four major components. First, it is intended that this system bring together the producer and the retailer directly or, through a wholesaler, eliminate many channel members which now exist in between.

Second, it is intended that this system spread price and quantity knowledge to both ends of the distribution channel so that the producer can sell his crops where prices are highest. Third, it is intended that the transporting of these commodities be streamlined by a central dispatching procedure which would lower the cost of transportation and increase its speed, thus reducing spoilage and handling cost. Finally, it is intended that the system instill a system of grades and standards to allow the efficient allocation of a product to its uses, as well as make the whole communication and buying system meaningful and realistic.

At the time of this research, one of the urban centers (Recife) was under construction, and was named Central de Abastecimento de Recife (CARE). Since that time, February 15, 1968, the partially completed facility was opened for use. At the time of opening, five units of four silos each and sacking facilities, five of eight open buildings for use by producers of fruits and vegetables, and two of five buildings with stalls for use by wholesalers were completed. Further, the entrance facilities for weigh-in and recording volume and type of produce per truck were partially completed. As inducement for use of the facilities, there were no charges made for facility use and all incoming trucks were required to stop and register in the market. They were then free to go on into Recife, but many chose to deal with the newly established merchants in CARE. Further, to build demand, consumers were allowed to buy anywhere in the market and many did so because of the low prices. Both large producer cooperatives and large retailers set up selling and buying compartments which further stimulated the use of the facilities. Within three months almost all the wholesaling of fresh fruits and vegetables in Recife was transferred to CARE, and the Santa Rita and Afogados wholesale markets dwindled to a very low volume. A start has been made, but it is evident that a very long road lies between the start and the full operation of the CANESA system.

The principal constraint on full implementation of the CARE project under CANESA has been the shortfalls in annual budgets of SUDENE, which have not permitted allocation of sufficient funds to complete construction of the physical facilities on schedule. Only as the critical support functions of communication, standard grading, transportation coordination and commodity brokerage are added can the basic concept of CANESA as a central wholesale system which allocates demand and supply of commodities and facilitates the flow of goods and services and demand in the system become a reality.

Otherwise, the CARE facility is just a wholesale market similar to what it replaced and may even add an extra step in the channel distribution. Finally, it should be noted that the way the facilities are now constructed, they cater to small volume transactions. If CANESA, through CARE, is to aid in the development of the area to its fullest extent, it must remain flexible to handle increasing volume transactions and even encourage increased volume transactions as the retailers and producers become able to increase their scale of operation. It would be a mistake to view CANESA as only a service organization to the traditional marketing system of small operators. Rather, it must be viewed as an institution to stimulate and serve those who are willing to struggle for a better way of food distribution.

Conclusions and Recommendations

Thus far this work has attempted to present a conceptual framework from which the analysis of the urban distribution of foods can take meaning, to present the data which supports parts of this conceptual framework, and to present the analysis of the urban distribution system which provides an understanding of the differences in the institutional structure.

The key elements in the conceptual framework are noted as three:

1. Increased scale of operation
2. Vertical integration and coordination
3. Retail aggregation.

Increased scale of operation has two possible positive effects. First, the increased scale of operation allows economies of scale to occur in the buying and selling process. The comparison of the retail types in terms of performance indicates that this conclusion has support. Second, the aggregation of buying power inherent in the increase in scale provides the potential for vertical integration and coordination. Certainly it cannot be said that the present channels for the self-service retailers are always shorter and more efficient than those of the more traditional retailers, but in many cases they are, especially for the very large retailers. However, instances where the farmer brings his crop directly into the urban market to be sold in the street fair or market exist also. But, as has been pointed out, as the urban

market grows the traditional marketing system proliferates, causing long channels of atomistically small members each of whom repeats the diseconomies of small lot handling, storage, transportation, delays, etc. Either this proliferation occurs or some forms of aggregation evolve. It is with this process of aggregation that the recommendations must deal.

How can aggregation be achieved so that vertical integration and coordination occurs? Where should aggregation be encouraged? These are the key questions which remain and the ones which development planners must grapple with. First, channel members, including producers, tend to look toward their market as a critical barrier to expanded output. If there is uncertainty of being able to sell the products at all or for a reasonable price, the operators would resist increasing their costs to improve their flows of goods. The data in Chapter 5 substantiate this reasoning for retailers and wholesalers. Retailers and wholesalers in the more traditional system of distribution saw the uncertainties of demand as a far more important limitation on their expansion and profitability than they did the conditions of supply. Logically, it is safer to try to obtain increased supply if demand is assured at stable prices than it is to attempt to increase supply in the hope that a favorable demand condition would result. These conclusions suggest one possible strategy for fostering vertical integration and coordination. The suggestion is that aggregation can have effect in breaking down the barrier of the channel through a close linkage with mass demand in the urban areas which allows the aggregation of power in the retail structure which, in turn, through a search for supply sufficient for the urban demand, provides sure markets for, as well as forcing change on, preceding channel members. It is in this way that vertical integration, coordination and modern distribution could be fostered.

The second line of argument is that there was less danger in aggregation at the retail level than elsewhere in the channel because of the possible competitive structure that could exist at retail level but that might not exist as easily prior to the retailer. This is to say that the urban consumer demand is great enough to allow many aggregated retailer institutions to exist and compete while a large assembler might be able to dominate a producing region with monopoly powers. The forces of competition could not then bring about the desired effect of efficiency and price reduction in the channel. The data in Chapter 5 substantiate the fact

that, even in their fledgling form, the self-service retailers feel more competitive pressure and compete more aggressively than the other retailers. The largest retailers compete even more aggressively, as was indicated in Chapter 5. The depth interviews with wholesalers and government officials indicated that the strength and influence of the wholesaler had at one time been strong to the point where the wholesalers had extracted monopoly profits from the system. As has been noted, changes in the selling practices of producers and changes in tax laws have largely reduced this power. The important point to be made here is that the wholesalers did not use their position of power to improve the efficiency of the channel. In the rural areas, no conclusion from the research data can be made as no large assemblers or buyers were found. However, it is interesting to note that the small buyers and assemblers did act as if they were in a non-competitive environment.[2]

Finally, the third argument on the use of the retail structure for the foundation of aggregation is that the retail level provides one place to achieve scale increases. The comparisons of the retail types in Chapters 3 and 5 demonstrate that already there are innovative retailers attempting to achieve the aggregation desired. The change is but a start, but the fact that it is occurring spontaneously is encouraging. Thus, the retail structure, already in the change process, is ready for further modernization. At no other point in the channel from producer to retailers is there an institutional arrangement as ready to move ahead as the retail structure. Certainly the wholesale structure is not, as presented in Chapter 5, nor are the rural institutions which lag further into the traditional mode of operation.[3] It is logical to expect the urban sector of the economy to modernize more rapidly than the rural sector, and it is important to take advantage of that change in process to influence the rural sector to modernize as well. This is the nature of the internal national (regional in this case) market thesis presented in the first chapter.

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[2]See: Donald Walter Larson, "A Diagnosis of Product and Factor Market Performance in the Bean Industry of Northeast Brazil," unpublished Ph.D. dissertation, Michigan State University, 1968.

[3]*Ibid.*

Before moving on to the specific recommendations that stem from this research and conceptual framework, it is necessary to make clear two kinds of limitations. First, by nature, recommendations are speculative as to their real value to the system and as to their costs. It is not the purpose of this chapter to present a detailed cost benefit analysis of the reforms suggested. Rather, the areas of costs and benefits will be presented and, if estimates of the effects of change in the economic system are desired in mathematical terms, the reader can find this analysis in the work on systems modeling performed by Thomas R. Webb[4] (see Chapters 11 and 13 of this report). This systems model, it might be added, is a specific attempt to measure the first- and second-order changes in the economic system that stem from the reforms that are implied from the research.

Second, recommendations cannot or should not be made without full consideration of the environment in which the recommendations are to be implemented. The practicality of each recommendation must be tested by the reality of actual situations and institutions. Thus, much of this work has been dedicated to the presentation of those realities in the urban marketing system. It is further advisable that reforms be based on existing ways of behavior and present institutions and move forward from those starting points. Hence, the recommendations presented hereafter are designed to institute change as an evolutionary process of the present system rather than to suggest that sweeping changes in institutions and attitudes ought to be made.

Large-Scale Retail Store Encouragement

Background Information

It has been pointed out that self-service retailers have been growing in Recife and are expected to continue to grow in the future. It has also been pointed out that self-service stores have not as yet brought the full advantages of supermarket operation to Recife and to the economic system of Northeast Brazil. Some of these shortcomings need further examination.

Although significant price gains have been made through large-scale self-service retailing, there is much that remains. First,

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[4]Thomas R. Webb, "A Systems Model for Market Development Planning: Northeast Brazil," unpublished Ph.D. dissertation, Michigan State University, 1968.

additional efficient large-scale retail units and modernized existing units would further reduce the retail price level of food through the same mechanism as was detailed in Chapter 4. By no means has the majority of the food retail system been affected to the extent that it might be. Further, additional large-scale units would extend the price effect directly as well as indirectly.

Second, the full force of the price effects have not been brought to bear in predominately poor areas of the city. The present large-scale units were built in the relatively higher income areas and built to serve higher income customers. When asked why promotion of his store was not made to the lower classes, one supermarket operator replied that he did not think that his store could handle the traffic. Hence, the lower income class market remains open for development. It is through large-scale efficient retailing that the real impact could be made in this sector. Typically, lower income consumers pay higher prices than do higher income consumers, and thus a larger income effect could be expected in the lower income areas where the most help is needed. It should be noted that though the same concept of high volume, low margin selling could be used, the physical facilities and promotion will have to be tuned to the lower income market as would the product mix, product quality, package size, etc.

Third, the appearance of the supermarket has not significantly affected the prices of meats, vegetables and fruits. The large-scale retailers have not typically handled these goods because of the uncertainties of supply under the present distribution system or the high cost of special fixtures. Few large-scale operators have yet made the effort to vertically integrate or coordinate their supply systems for fresh agricultural products and thus have ignored an area which has both profit potential and price reduction potential for the benefit of the consumers. It should be noted that vertical integration and coordination of fruits and vegetables is not likely to be achieved easily because of the perishability of these goods as well as the nature of production by many small producers. This is not to say that gains cannot be made, however.

Finally, though some vertical integration and coordination of cereals has taken place, the major gains from this activity have not yet been achieved. Because the cereals are not highly

perishable and can be stored, vertical integration and coordination could be more easily brought about than for the high perishables mentioned above.

Thus, though the initial step has been taken to bring the benefit of large-scale retailing to Recife, many areas of benefit still remain open for development. Although it has been documented that self-service retailers plan to grow, it is useful to specify current expansion plans. At the present time, there are four new supermarkets under construction in Recife. Many of the smaller *mercadinhos* have immediate expansion plans. Of a sample of nine medium-sized self-service retailers, four had definite plans to expand, two of them into new, larger stores. Those operators who planned expansion felt an urgency to move rapidly, as they said that the market is right for expansion now. This feeling seems to be borne out by the larger supermarket operators who are moving ahead with expansion.

Seven of the nine above-mentioned medium-sized self-service operators voiced interest in introducing fruits, vegetables and fresh meats. The larger supermarket operators have already started limited fruit and vegetable sections in their stores and talk about the possibility of introducing meat.

Thus, expansion of the self-service sector of food retailing is assured through natural market forces. The question arises, why not let this development run its own course? The answer is twofold; mainly, the present expansion thrust does not include adequate considerations of product line expansion and, more importantly, the economies of vertical integration and coordination which make the fresh agricultural product expansion profitable and of real value to the consumer are not being considered. Vertical integration and coordination of non-processed food product lines has not extensively taken place. Finally, store construction in the low income areas is insignificant. This is not to say that benefit will not result from natural expansion, but only to say that the benefits could be amplified.

Though many self-service retailers desire and plan expansion, the resources available to the self-service operators limit the ultimate benefit which will result. The next step is to summarize these limitations which hold large-scale operators at less than maximum efficiency, and then to present the steps necessary to remove these barriers while ensuring that the resultant growth promotes the benefits discussed above.

Chapter 5 has shown that the lack of financial resources was seen by the self-service retailers as the most important barrier to expansion. By sales value and size, the largest ten retail organizations felt strongly that lack of financing was the major problem. This was further amplified in depth interviews of most of these firms. Although the largest organizations do have financial strength, they emphasized the lack of financing available in Recife for commercial firms. If long-term financing were available, they felt, they could expand much more rapidly than their present rate. The rest of the large retailers have considerably less financial resources and considered long-term financing very important. Although many of these retailers are presently expanding, they cannot finance the full extent of their ideas, and thus remain considerably smaller and less efficient than would be desirable.

Because the lack of available financing was seen as so important, it is worthwhile to digress at this point to describe the present financing of the commercial sector.

Bank credit is available to "strong" firms, which typically means that the firm is one of a group and the assets and deposits of the entire group stand behind the loan. The legal limit in Brazil for bank loans for commercial firms is 180 days, but, in practice, banks rarely loan for more than 120 days. Very strong firms can renew their bank loans and thus use short-term revolving credit for expansion of facilities at some risk. Few commercial firms are strong enough to utilize this source of credit. Public banks, Banco do Brasil and Banco do Nordeste do Brasil (BNB), both offer a maximum of 120-day credit at 22% annual interest, in addition to inflation rate, to strong firms with liquid assets, with good credit standing, and in many cases with outside assets available as collateral. Public bank, Banco do Desenvolvimento do Estado de Pernambuco (BANDEPE), offers 90-day credit and, in rare exceptions, 120-day credit at an annual interest rate of 24% in addition to the inflation rate. It is of interest to note that one of the financially strongest supermarkets complained about the difficulty of getting government financing. Private banks offer 120-day credit at around 36% annual interest under the same general criteria as the public banks.

Credit agencies, of which there are three of consequence in Recife, will give 6- to 24-month credit for working capital to firms which can secure durable goods in a warehouse of the same

value as the loan. The commercial sector lacks this collateral, though other firms of the same group as the commercial enterprise could put up the goods. The cost of this kind of credit is very high, running up to 5% a month when all charges are included (60% simple annual interest).

Finally, the government has innumerable special programs and legislation on financing of various kinds of private enterprise, but there are none in the commercial sector (Article 34/18 does not apply to the commercial sector). The fact that supermarkets sell without legal invoices (cash register receipts are not adequate) and are thus illegal also discourages both private and public financing.

It is of interest to view the financial structure of one supermarket organization as an illustration of the sources of funds available to large firms in the commercial sector (Table 6.2). Note that over half of all liabilities (51%) are accounts payable and 16% are in short-term bank financing. Capital and surplus account for only 31% of all asset value, and there is no long-term debt.

Table 6.2 Financial Statement

	Percent of Current Assets	
Current assets	100%	
Current liabilities	110%	
Working capital	(-10%)	
Assets:		100%
Cash	11%	
Inventory	52%	
Net fixed assets	35%	
Other, Misc.	3%	
		100%
Liabilities:		
Notes payable to banks	16%	
Accounts payable	51%	
Dividends payable	2%	
Long-term debt	0%	
Common Stock and surplus	31%	
TOTAL		100%

SOURCE: SUDENE/MSU Special Retail Study (1967).

The short-term bank financing would not be present in most large-scale retailers' financial sheets.

Depth interviews also revealed barriers which direct questioning failed to uncover. Most important of these was the lack of trained managerial talent for expanded supermarket operation. All large-scale retailers relied on on-the-job training for their employees and most were having trouble with the training of managers for new store openings. Some self-service retailers viewed this as a really critical problem.

Another barrier to expansion which had weak general support in the survey data--irregular supply--showed up in depth interviewing as a very important reason why large-scale retailers were not moving into the fruit, vegetable and fresh meat areas. All of the larger retailers were interested in entering the fresh meat business, but many felt that they could not rely on the present meat supply system. The others could not finance the necessary display and packaging equipment. For fruits and vegetables, the story was much the same. Large-scale retailers did not feel that they could develop reliable sources of supply. It is interesting to note that most of these retailers had not spent resources to try to develop reliable supply sources in these areas.

In conclusion, the major barrier to increased scale and efficiency for large-scale retailers is clearly the lack of financing. However, the lack of real effort spent on vertical integration and coordination by large-scale operators results in a second limitation on their degree of scale and efficiency increases. Finally, the lack of trained managerial personnel forms a third limitation on expansion. If left alone, the lack of both financial and technical resources would cause the present expansion thrust to solidify without full advantage being taken of the opportunity which exists. Thus, the innovation of large-scale self-service retailing would be less efficient than it could be with improved financial support and guidance.

Description of Reform Program

Thus, from the point of view of both the development planner and the large-scale and potential scale retailer, a facilitory program of long-term credit and managerial training would fill the needs to accelerate the growth and impact of this sector of retailing.

As has been pointed out above, the major barrier to self-implementation of desirable reforms by large-scale retailers is

the lack of financial resources. Further, because long-term financing is not available to the commercial sector in Recife, a program of financing at reasonable rates of interest is necessary. This program would have the objective of financing expansion of efficient food retailing operations. This includes expansion of large-scale efficient retail units and expansion of projects to develop vertical integration and coordination. Applications for funds would be judged primarily on their prospective contribution to the efficiency of the retail sector and on the applicant's ability to achieve the operational efficiency claimed.

Simply providing funds is not enough to ensure the efficient expansion of the food retailing system. A training program is needed as well. This program would have two levels; first, present and prospective managers and owners of retail firms would be invited to attend a series of seminars on such topics as product mix, margin mix, integration and coordination, layout, product handling, accounting and inventory control. Included would be a presentation of the above-mentioned financial program, its objectives and requirements, and plans for an employee training program. Thus, the ideas of large volume, low margin retailing with supporting supply systems would be presented along with the possible means of achieving these goals.

In addition to the above management training program, a second level of training is necessary to provide the present retail structure and its expansion with capable, knowledgeable, middle level management and employees. The various present or prospective firms could send employees for training, or individuals could enroll in the hope of obtaining employment in the field.

In summary, what is needed is a program which supports the present entrepreneurial talent which already is moving toward expanded scale and efficiency of large-scale retailing. The program thus becomes a service to facilitate those kinds of institutional arrangements which lead to ultimate consumer and producer benefit.

Expected Benefits

The extent to which businessmen use the above programs determines the relative benefit of the programs. Thus, it is impossible to place an exact monetary outcome on the program. Further, expansion of large-scale retailing is an ongoing process which the above programs are designed to aid. The spontaneous benefits cannot be easily separated from those facilitated by the program. Finally,

some benefits would not be quantifiable even if the nature of the expansion were known. It is useful, however, to list the expected benefits and, where possible, examine their order of magnitude.

First Round Scale Economies - It has been pointed out that there were only a few really large-scale operators in Recife. Those who aspire to size, yet cannot finance expansion plans, still buy in very small lots. Thus, if financing and technical aid were to facilitate larger-scale purchasing, savings to the system could be made. Although many processed goods are already bought directly from the manufacturers, purchasing has an important effect on price.

As has been mentioned above, many of the processed products are bought directly from manufacturers, even by relatively small operators. However, in the areas of cereals, fruits, vegetables and meats, few large- or small-scale retailers buy directly from producers. It is in these areas of complex and costly channels of distribution that large-scale retail units could have a strong effect in the reorganization of the system. Vertical integration and coordination could facilitate additional economies of scale at the production level as well.

For fruits and vegetables, particularly the latter, vertical integration would have a far greater effect but would be much more costly to develop initially. The scale of the whole system would have to be reoriented, but, once done, benefits in terms of low spoilage, high quality, efficient handling and efficient transportation would allow much lower prices to the consumer for better quality produce.

Vertical integration in fresh meat holds potential benefit as well, although the capital needed for fixtures and equipment at the store level and transportation and feedlot development at the supply level would be high.

The expansion of the number of true low price, high volume retail outlets and the introduction of vertical integration should not only extend the benefits of low margin retailing to a broader sector of the population, including more low income groups, but should reduce the input price base and thus the selling price to consumers.

Second Order Benefits - The lower prices from the first order effects are a direct benefit to the system. However, more importantly, these lower prices act as a stimulus which lowers the general price level of the system. This phenomenon was seen in

the introduction of Bom Preço and could be expected to apply again, given the above changes. The average margin of medium-sized self-service retailers fell about 32% with the entry of Bom Preço but the average margin still rests at about 33% above that of Bom Preço. With the increase of large-scale low price units, this difference could be expected to fall significantly. Further, vertical integration and coordination of some large volume, low price units could create a downward shift in the price base upon which the margins are calculated, further precipitating a general price decline.

As has been pointed out, vertical integration and coordination would force modernization of the supply system. Managerial talent would diffuse back along the channel as large-scale retailers attempted to rationalize the supply for their firms.

Finally, vertical integration and coordination can be thought of as a "market looking for supply." Because the market exists, risks of incurred production are reduced and producers are willing to take advantage of larger-scale production methods. Thus, vertical integration by large-scale retailers stabilizes the market for the producers and the surviving channel members.

All of the benefits tend to affect consumer price through a lower base price with which retailers buy or a lower operating margin based on this lower base. Thus, the consumer buys for lower prices, which is the same as increasing his real income. He now has more to spend on food and non-food goods, which reinforces the scale economies of the food retail sector and provides larger markets for the non-food sector. This latter effect makes institutional development of consumer goods more attractive and thus is an impetus to the industrial sector development. The institutional development provides employment income which further increases food and non-food consumption, thus allowing for further economies to accrue.

Costs of the Program

The costs of this program would involve the initial loan funds and the cost of technical assistance. The costs of servicing the loan money would be covered by the interest charges to be paid by the retailers for the use of the funds.

Summary and Conclusions

Analysis of the retail sector has shown that significant gains have been made through the introduction of large-scale, low margin retailing, although as yet the number of such retailers is very small. Further, a number of medium and large self-service retailers plan to expand in the near future, yet financial and technical barriers stand in the way of their achieving the full benefits of large volume and low margin. Thus, a program of service to the private sector has been formulated to help those who want to achieve high volume, low margin selling and those who want to develop integrated or coordinated channels of supply.

The question of how many large-scale retail food stores should be encouraged and at what rate per year they should be introduced is relevant at this point. Though no definite answer will be given, it is possible to lay down some guidelines. If the rate of entry is too slow, the danger exists that a loss of competitive behavior on the part of the existing large retailers could occur, i.e., they would behave as the large wholesalers have. On the other hand, if the rate of entry and growth is forced beyond the managerial talent that exists in the system, then the loss of efficiency becomes a danger which points to the costly failure of some of the retailers. The optimum rate of growth is somewhere in the middle. The best guide to this middle road is the natural interest flow evidenced by the system members. This is to suggest that help and training should be given those who take an active interest in improving their businesses along the lines suggested in this chapter.

Coordination of Fairs and Markets

The major reasons for initiating help for the self-service retailers are that, of all the retailers, they were the most willing and able to change, they already were in the process of change, and they were moving in a direction beneficial to the development of the region. These same reasons cannot be cited for the atomistic retailers. Three facts stand out. First, the atomistic retailer was found desirable by the consumer as evidenced by continued loyalty. This fact was brought out in Chapter 4. Second, the differences in efficiency and price at this juncture are not that great between the self-service and atomistic retailers. Certainly, the style of retailing in the fairs does not incur certain kinds

of costs that the capital-intensive self-service retailers do. Finally, tremendous volumes of goods pass through the fairs and public markets. The question is how the street fairs, fixed fairs and public markets can meet the new and increasing competition of the self-service retailer and contribute to the development of the region rather than slowly and bitterly going out of existence. This is to ask: How can the fair and market be turned into an asset to development rather than a drag on it? Before answering this question, it might be helpful to review the position of the atomistic retailers.

Background Information

In Chapter 5 the nature of the Recife atomistic retailer was presented. The picture was of a fairly rigid, poor member of a traditional marketing system. The evidence is clear. A plurality (42%) of the atomistic retailers reported that in the past year their volume had declined, while only 30% said it had increased and 28% reported the same volume. At the same time, the number of atomistic retailers selling food had increased about 24% (between 1966 and April 1967). Thus, many of these retailers have already felt the bite of competition from the growing number of large-scale retail units (supermarkets, *mercadinhos* and large refrigerated meat dealers).

Further, the changing composition of merchandise in the street fair shows where the effects of the self-service movement are felt. It would be expected that those *feirantes* with lines of products in direct competition with large-scale retailers would decrease in number, while those who do not compete with large-scale retailers should increase in number. This hypothesis is borne out by the census data of April 1967 as compared with 1966.[5] For cereals and canned goods, where supermarkets and *mercadinhos* are strong, the number of *feirantes* decreased by 13% of all cereals and canned good dealers. For meat products, where large refrigerated meat stores compete with the *feirantes*, they decreased in number by 21% of all meat dealers. Finally, for fruits and vegetables, where supermarkets have not competed, the number of *feirantes* increased by 16% of all fruit and vegetable *feirantes*.

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[5]The census data collected in 1967 was by the SUDENE/MSU research team, while the census in 1966 was made by the city government of Recife (PMR).

There seems to be little indication that, if left alone, the atomistic retailer could or would compete aggressively. First, the accumulation of financial resources in the fair or market is unlikely, as has been pointed out in Chapter 5. Second, the atomistic retailer to date has not pooled his strength and financial resources. Third, the atomistic retailer himself seems to have no inclination to step out of his traditional role to attempt combative changes. Recall that 94% of all atomistic retailers would not take any positive action other than simply existing or going out of business if a supermarket took 1/2 of their business. Perhaps they feel that they are too small to compete; perhaps they cannot shake their traditional shackles; perhaps their resource base is too low. Whatever the reason, the fact remains that a gradual extinction faces the atomistic retailer. Maybe from an economic standpoint it could be argued that progress and development must take its course and the atomistic retailer should be forced out of business. This solution certainly is not socially sound in an area of chronic underemployment. It is not politically feasible and may not be economically sound.

Two alternative approaches could be taken. First, the atomistic retailer could be forcefully put out of business or bought out of business. But this solution does not solve the social problem and would be politically unfeasible as well as costly. Second, the market structure of atomistic retailers could be reformed into a viable economic competitive unit. This solution has severe problems, as the operator lacks willingness to help. Notwithstanding this fact, the possibility of this solution will be explored in detail below to see what could be done and if the traditional blocks of the atomistic retailer could in fact be circumvented.

Before setting forth on a description of the possible reform, a summary of the reasons for the lack of fair competition advantages in the fair and market might be useful.

1. The physical conditions of the fair and market are repulsive to many shoppers. They are predominantly unsanitary, dirty, with spoiled food and wrapping materials littering the ground. Even the operators often have poor appearance with tattered clothes, etc.

2. The prices in the markets are generally equal to or higher than those in the competitive large-scale units for the same or lower quality of product. This conclusion was verified by the price study reported in Chapter 5.

Further, large-scale units maintain better quality control, thus giving the customer a more constant reliable source of food products. The price and quality differentials are caused largely by the supply system of intermediaries, poor handling, inefficient transportation methods, long duration of time from harvest to market, though the atomistic retailers themselves add tremendous labor, credit and spoilage increments to the price.

3. Finally, the existence of unemployment aggravates the situation because many unemployed persons have no alternative but to enter the market system for survival, thus causing an oversupply of operators. This oversupply decreases the amount that each atomistic retailer can sell to the point where he can barely live, let alone accumulate resources to invest in his improvement.

Description of the Reform Program

Two types of reforms are implied by the above analysis to help the atomistic retailers contribute to the development of the region. One is to attack the physical appearance and convenience of fairs and markets and the other is to confront the internal disorganization within each fair and market.

The first set of reforms deals with the physical appearance of the market facility. The layout or organization of the fair would be changed to accommodate customer flows. This means wider aisles but more importantly, the grouping of the operators by commodity to facilitate the traffic pattern. The principles of supermarket traffic flow would be useful in developing new layouts.

The fixtures used in the new organizational pattern of these markets must be attractive. This means that they facilitate the neat display of goods while in themselves being clean and attractive. The use of many bright colors would add immeasurably. Importantly, these fixtures must be of a design and material that retains its attractiveness over many years of use. Finally, for the street fair, these fixtures must be easily movable and storable for efficient set-up and take-down of the fairs.

Third, fairs and markets must be kept clean during operation. This would require investment in rubbish containers (painted oil drums would do nicely) and would require janitorial service during operation.

The second area for reform deals with the organization of the operators themselves to achieve more efficiency of distribution through this institution and in the supply channel to it.

This improvement would allow lower consumer prices yet provide reasonable standards of living for the atomistic retailers as well as permit them to accumulate enough capital to keep the structure adaptive. There are three basic areas in which this institutional organization would operate.

1. On the supply side, the organization of atomistic retailers would consolidate the buying power of the operators so that volume purchases would be made at relatively low prices. Thus, each operator would buy from the organization at the fair or market site. With this pooled volume purchasing, vertical coordination would be fostered by the organization which would allow direct purchasing from producers, millers, etc. for its members' mutual benefit. Thus, the price paid by the atomistic retailer would be further reduced through rationalization of the supply channel. Finally, the organization of atomistic retailers would, where necessary, arrange or provide for the transportation and storage of the commodities. Again, savings would be made through reduction of the time that commodities wait to be sold, through improved handling, packing and storage practices, through efficient large lot transportation by truckload rather than by basket, etc. It is important to note that the organization could institute a program of grading and standards which would further allow the segmentation of markets and more efficient product use. Further, important services could be rendered by the organization, such as reasonably priced credit, etc. A note of caution needs to be sounded again with respect to the expected gains from more centralized handling and vertical coordination of highly perishable foods. Though large gains can be made, in the short run their costs will be high.

Most of the above activities could be coordinated through the CARE wholesale facility described in the last chapter. This would conceivably take much of the risk and uncertainty out of the reform and reduce the short-run costs of implementing the program.

2. On the consumer side, the organization of atomistic retailers could promote shopping in the participating street fairs and markets. Mass media advertising could be used along with within-fair promotions such as music, loudspeaker advertising, raffles of merchandise, and other programs favoring member-cooperative retailers. Further, the organization could organize the services of the *feira*, such as the boys who carry packages through for customers. Finally, the organization could enforce ceiling prices on those retailers who purchased from the organization and thus ensure the low price, high volume orientation which is the basic foundation for the success of the endeavor.

3. Finally, the organization of atomistic retailers would have to control the size of the *feira* so that it corresponded with demand. This control would be both of

products and of numbers of operators. It is important that this correspondence of supply and demand be maintained, as the efficiency of the fair and its ability to compete are tied to the proper balance of retailers.

Thus, each fair and market would be welded into a unit exerting its combined influence to increase its competitive position within the retail system of Recife. It should be stressed that the organizational and physical appearance reforms must go hand-in-hand or the gains to be made on the one hand will be taken away by the other. Neither reform alone will have a lasting effect.

Implementation of the Program

Before moving on to the benefits and costs of this reform program, it is necessary to determine if the program is feasible. Given the profile of the atomistic retailer already painted, it would seem that this kind of program would be doomed to failure. Yet even if the operator were not willing to initiate cooperation by himself he might cooperate with a central organization if the economic incentives were made compelling enough.

Of the two types of reforms, the physical renovation of the fair and market does not rest in the operators' control, i.e., the atomistic retailer is simply a taker of his place of business. The present facilities of the street fairs are supplied by several individual businessmen and the organization of the street fairs and markets is controlled by the city government of Recife (PMR).

It should be noted that the development of these layout facility reform ideas presented above was made by the city government of Recife. The city government suggested that a private company be formed of the present "table suppliers" to form the basic organization to handle the distribution of the new facilities. The "table suppliers" had been contacted by the city government and had agreed to form such a company. However, the financing of the new facilities remained a problem.

The city government had moved ahead with the design of new facilities for the street fair which met the requirements for modernization. Finally, the city government started reorganization of the street fair. Thus, the machinery for renovating the street fair appearance exists, being held back only by a lack of financing for the new fixtures. Technical assistance is badly needed as well.

Clearly, the atomistic retailer could veto his own organization by non-cooperation. However, two strategies could be employed

to overcome this resistance. First, the organizing force could be his own union. When asked if they belonged to a union, 51% of the *feirantes* responded that they were members of the Commercial Retailers' and Fair Operators' Union of Pernambuco (Sindicato do Comercio Varejista e Feirantes de Pernambuco) and 3% belonged to other unions. When asked if they thought that their colleagues felt that the Commercial Retailers' and Fair Operators' Union could be more help, 69% said yes, 15% did not know and 16% said no. Thus, the door is open for this union to step in. The president of the Union discussed with the city government and this author the role of the Union as the organizing force and concluded that the organizational program, as developed during these discussions and presented above, was indeed realistic. In fact, the Union had already organized the central purchasing of some cereals and felt it could organize the more pervasive system proposed, provided that financial resources could be made available. Again, technical assistance would be necessary if the program is to succeed.

The second strategy for gaining atomistic retailer support and cooperation is purely economic. As the Union publicizes its lower prices and those retailers who are willing to cooperate initially take advantage of these prices, the non-cooperative operators will be placed at a price disadvantage. As they see that they cannot compete, they will change, through the help of the Union organizers, in lieu of going out of business. This change will not be a simple or smooth process, but with the Union pricing initially at a loss and with support from a number of sympathetic retailers, it is possible to swing the balance if resistance occurs. This program should be instituted in one fairly large street fair first. After several months of successful operation, the other atomistic retailers should be eager for the same advantages and be considerably more cooperative.

Thus, in conclusion, the machinery for implementation of these reforms already, in part, exists. More importantly, the city government, the Commercial Retailers' and Fair Operators' Union, and the "table owners" have pooled their ideas to support this reform package. This participation and cooperation more than anything else ensures the feasibility of the reform package.

Expected Benefits

First Round Scale Economies - There are three types of benefits related to scale which would tend to lower the price of food to the

consumer. First, the price at which the atomistic retailer would purchase stocks would be decreased by centralized buying for many products.

Second, the proposed reforms should reduce the spoilage rates for these operators. Chapter 5 showed that the atomistic retailers had the highest spoilage rates of any retailer types. It should be noted that spoilage which forces reduced prices and spoilage that cannot be sold are included in the prices that the consumer pays. The consumer who buys spoiling goods at reduced prices really pays in relative quality. Obviously, the products that are unsellable form a direct cost that the retailer must pass on to the consumer.

Third, the centralization of buying power would allow vertical coordination as well as simple price reductions. Product handling, transportation and storage would also be streamlined to achieve a more efficient system. The results of these reforms might not show up in terms of price, but certainly they are necessary to achieve the reduction in spoilage and improvements in product quality. It should be noted that, of course, not all of this gets passed on to the consumer. Both the retailer and his organization will need financial support if the plan is to be operative.

There are several other benefits of the reform program which should be mentioned. First, one of the major expenses of the atomistic retailer is credit (Chapter 5). The organization could take over this function when necessary and give credit at reasonable rates in place of the present supplier and loan shark credit.

Second, labor is an important variable to consider. It was strongly stressed that the number of atomistic retailers would have to be controlled. This control could be maintained through restrictional entry into the organization. The benefit involved here is relative to what would happen if the atomistic retailers were left alone. Instead of decreasing incomes and increasing hardships, which would drive the already underemployed into the unemployed category, the system would support most of the present labor and give increasing opportunities for full employment and a decent standard of living. Certainly, not all atomistic retailers could become better off, but many more would be better off with the reform than without it.

Third, the organization would have the pooled resources of the atomistic retailers to embark on a program of shifting consumer demand back to the fair and market. The promotion of the fair and market, its revitalization in appearance, convenience and prices

would reinforce each other to bring the institution back as a competitively viable institution. This would strengthen the economies further through increased volume.

Second Round Benefits - Reform of the fair and market institutions has certain direct benefits to the consumer and the operators. However, the fact that the organized groups of atomistic retailers have a new power position causes further effects in the system.

First, competition certainly would feel the bite of the new price levels. Although many types of retailers do not have complete overlap of product lines, the atomistic retailers could have a similar effect on the prices of other institutions as did the opening of Bom Preço on June 12, 1966, noted earlier in this chapter. This effect would be especially strong in fruits and vegetables, which were largely unaffected by the supermarket innovation.

A second very important effect of the reform would be the changes brought about in the supply system of the fairs and markets. With the power of the atomistic retailers centralized in a professional management whose major job would be procurement, it would be expected that technical assistance would diffuse back in the channel. The professional trained management would constantly be searching for quality products, reliable sources of supply and volume sources of supply. To achieve these objectives, training and help would have to be offered from the outside at first. Thus, the atomistic retailers' organization would act to modernize production and distribution through its own self-interest.

Third, related to the above point is the market risk factor as perceived by producer or intermediaries. The volume buying of the fair and market organization would provide a large stable market for those producers who were willing to take advantage of the opportunity. This market stability is a necessary condition to the adoption of new technologies by the producer. Thus, the buying power of the organization and the managerial flow from the organization would combine to place the traditional supply and production system under stress to change.

Finally, the most important effect, the effect of lower prices on income, consumption, and thus development, has been dealth with already.

In summary, there are many benefits of the atomistic retailer reforms which must be balanced off against the cost of the pro-

gram. Though light can be shed on the magnitude of the first order effects, the second order effects, which are far broader in scope and impact on development of the region, are not quantifiable given the technology of this research. The next step is to assess the areas of cost of the program.

Costs of the Program

There are two types of costs which must be considered, start-up costs and operating costs. Start-up costs can be broken down into three categories: fixture company financing, street fair and market organization financing, and training and technical aid. The cost of renovating the street fair largely boils down to the financing of the fixture supply company. The street fair and market organization would also need a long-term loan to cover the cost of initial set-up, organization, equipment and facilities, and losses during the first year of operation. Training and technical aid would be provided by a public agency and would involve the salary of the technicians involved.

There are three areas of operating costs which must be considered: those of the fixture supply company, those of the street fair and market organization, and those of the operations. The basic charge for the tables and booths supplied by the company would have to cover the servicing of the initial loan for the fixtures, the setting up and removing of the fixtures weekly, and the administrative overhead of the company.

The street fair and market organization would have a considerably more complex cost structure. Included would be the cost of product transportation, product buyers, storage, administration, promotion, insurance, etc. These costs would have to be covered by the margin of the organization.

Summary and Conclusions

Through the city government of Recife, the Commercial Retailers' and Fair Operators' Union, and the street fair table suppliers, a reform program has been developed which involves the renovation of the appeal of the public markets and fairs and the institutionalization of the operators themselves. The possible benefits of this reform suggest that it is very worthwhile from the standpoint of lowering the prices of food to the consumer and thus, in effect, increasing his income.

Voluntary Full-Line Wholesaling

Background Summary

In previous sections of this chapter, programs have been presented which were designed to foster economies at the extreme of the retail spectrum, at the atomistic level and at the large-scale level. The desired result would be a significant reduction in the price level for foods. The neighborhood stores and small self-service operators could be a counter-force to this trend, as they would not have the conditions for lowering their prices. Thus they would hold prices up to many customers and would slowly be driven out of business. It is desirable to develop a means by which these small- and medium-size operators who do not have the resources to participate in the large-scale retail financing program can effectively compete in the retail market system.

Description of the Reform Program

The program would have the same conceptual foundation as the other two programs already described in this chapter. The goals would be to induce economies of scale through concentration of buying power and vertical integration and coordination. The mechanism for realizing these goals would be a voluntary full-line wholesaling organization. This organization would be made up of and controlled by member retailers who purchased from the organization. The organization would then have the combined buying power of the members to exert on the supply system to achieve competitively low prices. Further, the volume orientation of the organization would allow the same effort at vertical integration and coordination. Finally, the buying organization could provide various services designed to reduce costs of members and advance them. Thus, smaller sized retailers than the very large would have the opportunity to compete, profit from, and contribute to the development of the area.

Implementation of the Program

There is no present organization of these retailers which could be used as a base for such a reform program. The formation of the organization would be largely the responsibility of the individual store owners who felt that the organization could benefit them. These store owners and managers would be asked by the sponsoring public agency to attend the same training and information sessions as the large store operators, and the program would be spearheaded through these meetings.

The feasibility of the program, then, rests on the number of store operators who would care to join such an organization. All of the medium-sized retailers (10) who were asked if they would join and participate in such an organization enthusiastically responded in the affirmative. Several brought up the topic on their own during interviewing. They also, however, showed concern over the initial financing of the operation. Although all were willing to contribute capital to the organization in proportion to their size, none felt that the total funds needed could be completely raised in this manner. Thus, as with large-scale retailers, a loan program is needed to facilitate the efficient operation of the organization.

The loan could be administered through the same agency as the funding of the larger-scale retailers. Further, the training and technical aid program would be part of the already-mentioned program for large-scale retailers.

Thus, the idea of a cooperative venture to achieve economies of scale already has the approval of many small- and medium-sized retailers. With technical guidance and financing, the retailers could put into operation the organization and administration of the program.

Expected Benefits

The expected benefits of the above program are much the same in nature as those of the other programs suggested in this chapter. These will be recounted briefly as they apply to the cooperative buying organization of small store operators.

First Round Scale Economies - The prices at which the small retailer would purchase would be approximately equal to his larger competitors and, thus, allow the small retailer to compete and contribute to the general price decline to consumers.

Secondly, the volume purchasing would allow a sustained effort to be made to vertically integrate and coordinate some product lines, thus reducing the price of these goods still further.

Other first round benefits are as follows: Although it is common practice to use supplier credit as a form of financing, it sometimes is a very high-cost source of funds. The organization would reduce the cost of this credit by purchasing for cash in volume and then supplying the member retailers at reasonable credit rates.

This program would have a positive effect on the labor force. Instead of shrinking in number, small retailers would be able to maintain their competitive position, keeping themselves and their employees employed.

The organization could promote the sales of its members through the development of brands and membership symbols which could be used in advertising programs.

Second Round Benefits - The above-listed benefits would occur within a relatively short time after the program was initiated. The following benefits take a longer time to appear and usually result from the more immediate benefits. Rather than holding up the general price level of food to many consumers, the member small- and medium-sized retailers would aid in the general price decline.

As with the other programs presented in this chapter, this buying organization would affect the food supply system through vertical integration and coordination and the resultant flow of managerial talent back into the channel of distribution.

It has also been mentioned previously that the vertical integration produces a more stable market which induces a production response because of the reduced risks in volume production.

Cost of the Program

The major cost of the program would be the financing of the buying organization. This cost would be divided between the participating members and the loaning agency. The cost of technical aid to training programs would be included as part of the program of training large retailers.

Summary and Conclusions

As the large-scale retailers and atomistic retailers became more efficient, the medium and small retailers would become relatively costlier to society. Thus, the buying organization would bridge this program and allow the smaller retailers to contribute to the general price reduction. The cost is low for this program, while the potential benefits are great.

Consumer Education

Chapter 4 pointed out that there was a significant proportion of the consumers willing to adapt to the changing retail structure. However, those willing to change tended to have higher

income, education, and mass media exposure. The implication of this fact is that as the system changes to lower price forms of retailing the poor will tend to benefit less rapidly in monetary gain but more rapidly in terms of the share of income effect. Further, even if direct efforts are made to bring large-scale retailing to the lower income areas of the city, the poorer consumer may resist changing her buying habits.

Thus, significant benefits could be gained from a program of consumer education which points directly to helping the low income consumer use effectively what income she has to buy foods which are both low in cost and high in nutritional value. This program would have three aspects. First, it would teach housewives to understand the concept of nutrition and the nutritional differences between various foods. Second, it would instruct housewives on how to conserve the quality of foods through buying and handling practices. Finally, it would provide housewives with information on where to obtain the greatest value of food and nutrition for their expenditure of income.

The value of this kind of program is twofold. First, improved consumer shopping ability and information raises the real income of the consumer through greater quantity, quality, and nutrition for the same monetary expenditure. Secondly, these benefits would accrue to the lower income consumers who desperately need help.

It should be noted, however, that low income consumers may be resistant to change and limited in their access to media used to foster the changes in their conduct. Thus, change may come slowly from rational and well-intended efforts to reform the poor.

Conclusion

The basic strategy behind each recommendation is to build competitive retail units which then attempt to gain their share of the market. The process of competition forces each retail unit to improve its operation and improve its sources of supply such that the end result is better quality products, more convenience for the consumer, and lower retail prices. It is not the purpose of these reforms to force the extinction of any group of retailers, but to give all retailers a chance to participate in the development of the region, with those who do so being rewarded with increased personal gains at the expense of the others.

It is important to note that no basic value has been put on any retail type, no attempt has been made to say one type is intrinsically good and should be encouraged. What has been implied is that development of the market system is an evolutionary process wherein those forms of retailing finding success through improved efficiency and services should prevail. Further, as the region develops, the desires, habits, and needs of the consumers change, necessitating change in the retail structure as well; and thus the evolution. What adjusts the retail structure to match the consumer changes is the force of competition between units to satisfy the consumer. It has been the purpose here to suggest ways in which the present retail institutions could be molded into competitive units.

It further should be recognized that, although there will be competition between types of retailers, this is not the prime objective. The prime objective is to make each retail unit, be it a street fair or a supermarket, competitive with all other units. This is to say, a street fair must compete favorably against other fairs as well as against supermarkets. Some street fairs are going to fail to keep pace; some supermarkets will fail also, as will those neighborhood retailers who do not pool their efforts. Some who try to modernize will fail because they were not good enough at it. This is the evolutionary process. But none of this can happen if the basic level of competition is not stimulated and competitive technology and practices are not instituted. The ability to compete is primarily dependent upon the ability to change and react, which is linked to the ability to institute change to improve the distribution system. The ability to institute change is linked to size and power as well as know-how. Thus, these recommendations have emphasized the need to increase the power of those retailers who had little to begin with through structural changes in their links to each other and to the outer world and to further strengthen the self-service movement. The talents of the retailers combined with the choice of the consumers must determine the direction of the evolution in the system of distribution.

CHAPTER 7

CHARACTERISTICS OF FARMERS AND ASSEMBLERS IN SELECTED RURAL AREAS OF THE RECIFE FOODSHED

Introduction

According to data of the Getulio Vargas Foundation for the year 1960, agriculture in the Northeast accounted for about 46% of the regional income. For Brazil as a whole, agriculture accounted for about 33% of national income in that same year.[1]

The rural population of the Northeast is almost two-thirds of the total population in the region (Table 7.1). During 1960, 14.7 million people out of a population of 22.4 million lived in the rural areas.[2] The higher percentage of the population living in urban areas of southern Brazil is an indication of the higher level of economic development which exists in that region (Table 7.1).

Table 7.1 Percentage Distribution of Rural and Urban Population of the Northeast and of Brazil

Area	Percentage of Population	
	Urban[a]	Rural
Northeast	34.2	65.8
South	50.0	49.9
All Brazil	45.1	54.9

[a]People living in towns or cities with population of more than 2,000.

SOURCE: IBGE-Statistical Annual of Brazil (1966).

It has been estimated that the real value of crop production in the Northeast has increased nearly 6% annually since 1952, while

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[1]Instituto Brasiliero de Geografia e Estatística, *Anuário Estatística do Brasil* (Rio de Janeiro: Instituto Brasiliero de Geografia e Estatística, 1961).

[2]*Ibid.*, p. 88.

the value of livestock production has increased 5.3% annually (Table 7.2). If these rates of increase have actually occurred, then per capita output has been rising.

Table 7.2 Indices[a] of Real Value of Agricultural and Livestock Production in the Northeast 1952-62[b]

Year	Crops	Livestock	TOTAL
1952	78.0	77.3	77.6
1953	81.4	82.9	81.4
1954	98.2	93.4	96.9
1955	100.0	100.0	100.0
1956	103.6	101.5	102.5
1957	111.8	99.4	108.4
1958	92.8	59.4	85.1
1959	120.7	114.5	119.0
1960	132.8	123.8	130.4
1961	137.6	106.3	30.2
1962	142.8	121.9	136.1

[a]Indices in 1955 prices (base: 1955 = 100).

[b]The index numbers of this table represent the total production value of 31 crops and livestock production in the period 1952-62. These products which make up the index represent in value almost all the agricultural production of the region. The crops are: rice, corn, sweet potato, English potato, lima beans, beans, manioc, soybeans, avocado, pineapple, banana, oranges, lemons, mangos, watermelon, muskmelon, tangerines, grapes, garlic, onions, pepper, tomato, cotton, peanuts, cocoa, coffee, sugar cane, coconut, tobacco, castor beans and sisal. Livestock products are cattle (including milk), swine, sheep and poultry.

The index numbers of total value of production are calculated by comparing the total value of this production in each year with its corresponding value in the base year. The index used is a Laspeyres Quantity Index.

SOURCE: Dantas Wellington, *Econômia do Nordeste: Analise do Setor Agricola* (Recife: Assessoria Tecnica, SUDENE, 1965), p. 100.

It is clear that this annual increase in agricultural production has come about primarily, if not entirely, by the cultivation of new lands using traditional farming methods. The

cultivated area in the Northeast increased by over 76% from 5.2 million hectares in 1950 to 9.3 million in 1960.[3] Over this same ten year period, crop production increased 70%.

As indicated in Chapter 1, broad policy goals of a developing economy should be to reduce the real costs of food to urban consumers while at the same time increasing the incomes of agricultural producers. This can be achieved by improved market coordination accompanied by a technological transformation that increases resource productivity in the system--both in the farm production and product marketing phases.

Experience in other developing countries suggests that certain conditions would facilitate the technical transformation of agriculture in Northeast Brazil. These conditions are:

1. availability of new farm inputs at economically feasible prices;
2. extension of information on the use of new inputs and methods to farmers and input distributers;
3. development of adequate distribution channels for new inputs;
4. stable farm product prices at levels which make adoption of new practices profitable; and
5. an adequately coordinated marketing system to transmit products to consumers without undue costs.

The last three conditions are the subject of this and the next two chapters. In the remainder of this chapter, the economic characteristics, personal traits and attitudes of producers of selected commodities and of the assemblers who buy farm products are described. A special effort is made to focus on the relationships between these groups and to pinpoint bottlenecks or problem areas. Chapter 8 will present a more detailed description of farm organization, cultural and management practices, and will discuss the availability of farm inputs and consumer goods in rural areas. Chapter 9 describes and analyzes the product markets for each of the five commodities. Conclusions and recommendations for improving both product and input marketing are summarized in Chapter 10.

The Farmer and Assembler Samples

The five basic commodities selected for study in this project were beans, rice, manioc, cotton and milk. Four of these commodities

[3] *Ibid.*, 1963, p. 56.

are very important in the agricultural sector of the Northeast. In 1963, cotton ranked second behind sugar, manioc was third, beans fourth and rice fifth in terms of value of production for Northeast agriculture. Rank data for milk were not available.

The purpose of the research design was to identify the major supply areas within the Northeast for the Recife metropolitan center and to take representative samples of farmers, farm supply dealers and assemblers within those areas. In order to identify supply areas for rice, beans, manioc and cotton, preliminary data from a joint SUDENE/Ministry of Agriculture study were used to determine the major producing *municipios* in each state and through contacts with market agencies to further pinpoint the *municipios* selling a majority of their production in Recife.

The resulting sample areas for each of the commodities are identified in Figure 7.1.

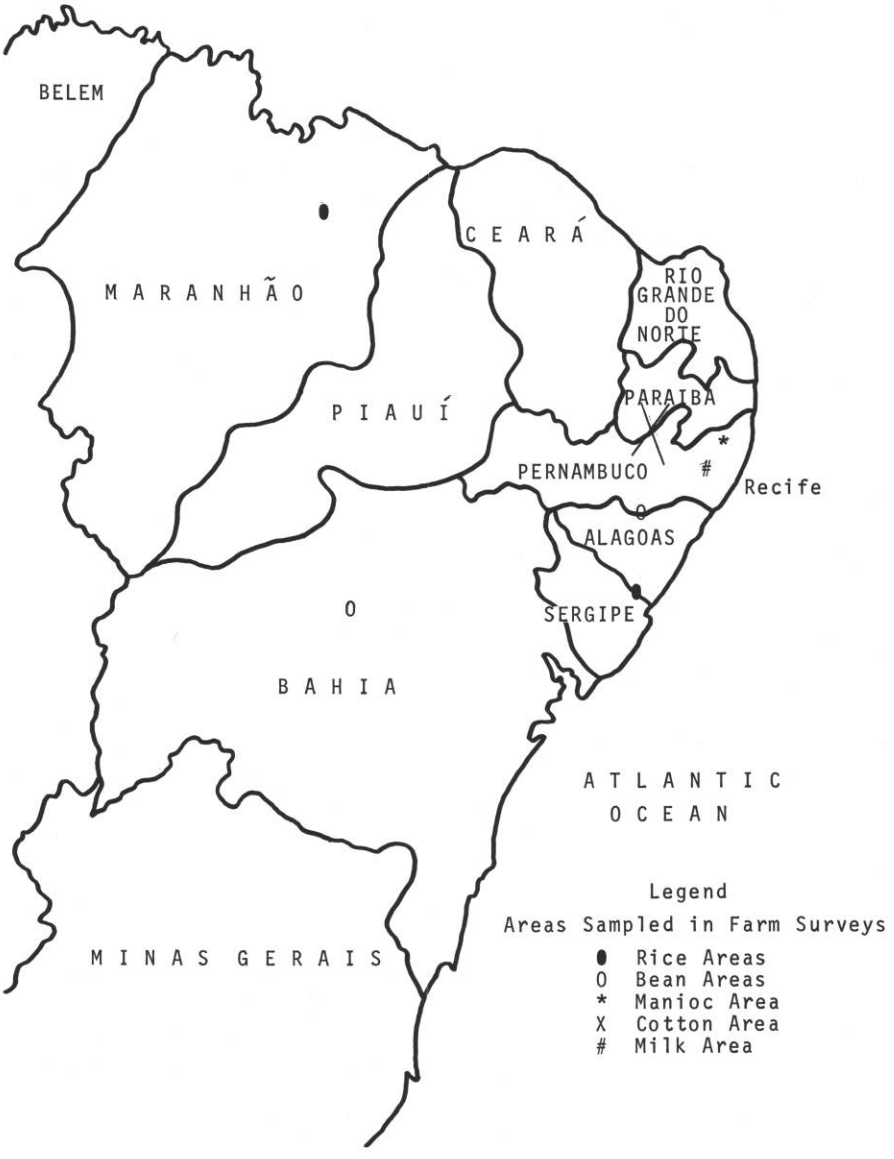
After having identified the *municipios* producing and marketing significant quantities of each commodity in Recife, a stratified random sample was chosen giving a higher probability of entry to those *municipios* with the greatest total sales in Recife.

After randomly selecting specific *municipios*, a random sample was taken of the farmers appearing on IBRA's tax list (see Appendix A for detailed discussion of methodology). Appropriately smaller farmer samples were chosen in those *municipios* which had been given a greater probability of entering the *municipio* sample in order to assure that each farmer in the entire sample area had the same chance of being chosen. A total of 774 farm interviews were made. The distribution by commodity was: rice 154, beans 177, manioc 151, cotton 165 and milk 126.

For purposes of this study, the dairy farmer population was identified as those milk producers who sold milk to CILPE, the Recife pasteurizing plant. A random sample of farmers in three different areas was chosen from the company's list of suppliers. The resulting sample size was 126.

In designing the sample of assemblers, it was necessary to first make lists of all assemblers in the areas where farmer surveys were being conducted. Then, using these lists within each of the commodity areas (especially with respect to small rural and itinerant buyers) and stratifying by type of assembler, a disproportionate sample was chosen. As a result, larger assemblers were given a greater probability of entering the assembler samples. This has necessitated careful weighting of all assembler survey results in order to give a true representation on any variable

Figure 7.1 Northeast Brazil Showing Sample Areas for Commodities Studied



SOURCE: SUDENE/Ministry of Agriculture Study, 1967.

being considered. The assembler sample sizes are given below by commodity:

Rice	42
Beans	59
Manioc	22
Cotton	46

In all cases in this report, the weighted results will be used since they represent a more accurate picture. The reader will notice that no milk assemblers were interviewed since the CILPE marketing system includes no such identifiable institutions.

Finally, all input distributers were interviewed in each *município* where farmers were sampled. Input distributers were identified as those selling hand tools, insecticides, tractors, fertilizers, feeds, improved seeds, livestock medicine and other such farm supplies.

Economic Characteristics

Farmers

From Table 7.3 a broad picture of the cash farm income situation for the various groups of producers can be observed. Milk producers have very significantly higher incomes than any other group of producers--nearly four times the average for all producers. The next highest income group is the São Francisco rice producers, who have average cash farm incomes of NCr$6,255. Cotton producers have the lowest income of all producers. The highest reported cash farm income in the sample survey was NCr$412,000 by a milk producer. The income distribution is skewed considerably toward small producers. In some instances, the sales reported by landowners may have included products sold for sharecroppers.

Average size of farms varied from the 19 hectares for the manioc producers to 444 hectares for the Codó rice producers. The largest farm was one of 3,000 hectares, but the median-sized farm is less than 100 hectares. As can be seen from Table 7.3, large farms do not always mean higher levels of farm income. Geographic location and type of farming are also very important determinants of farm income.

The most valuable farms are in the São Francisco rice area and the least valuable are in the manioc production area. The most valuable farm in all the areas studied was worth NCr$800,000 in

Table 7.3 Size of Farm, Cash Farm Income and Land Values by Commodities Studied, 1966

Commodity and Area	Average Farm Size In Hectares	Average Total Cash Income Per Farm[a]	Average Value of Land Per Farm[b]	Average Value of Livestock and other Capital Goods[c]
		NCr$	NCr$	NCr$
Rice:				
Codó	444	2,100	12,840	13,761
São Francisco	96	6,255	55,767	
Beans:				
Irecê	74	2,803	11,286	8,371
Al-Pe	81	1,835	11,030	
Manioc	19	1,505	7,094	2,106
Cotton	104	1,463	11,084	6,392
Milk	170	11,593	37,383	23,137

[a]Average total cash income per farm was obtained by asking farmers their sales of the major crops which they produce, sales of livestock, sales of livestock products and sales of other crops produced. The income figure is limited to those farms selling more than NCr$100.00 in 1966.

[b]Value of land was determined by asking producers what total sales price they would be willing to accept for their farm at the time of the interview.

[c]Estimates were obtained by multiplying the number of ox plows, tractors, jeeps, scales, cattle, hogs and other production goods for each commodity group by a constant estimated value for each of the items and dividing the results by the sub-sample size. The resulting values were summed to give an average value for each commodity group.

SOURCE: SUDENE/MSU Farm Survey (1967).

1967. The median farm value was about NCr$6000. The least valuable land per hectare was in Codó, where it was worth only NCr$28/hectare.

In addition to the value of land and buildings, estimates were prepared for the average value of livestock and other capital production goods for each commodity group of farmers. Dairy farmers were found to be the most highly capitalized, with an average value of NCr$23,137. Next were rice, beans, cotton and finally manioc farmers, who possessed capital goods averaging only NCr$2,106. This was the same order of ranking as exists for land values. We can, therefore, conclude that, on the average, dairy farmers require by far the greatest capital investment (NCr$60,510), followed by rice, beans, cotton and manioc farmers (NCr$9,200). Although the value of capital goods seems quite low for manioc farmers, it should be remembered that with such low incomes as exist in the Northeast, it would be very difficult for the average farm worker or sharecropper to save enough to capitalize even a manioc farm. Even these low capital values are usually the result of years of accumulation and saving. Moreover, with so little collateral it is often difficult for farmers to obtain loans to purchase capital goods and, when such is possible, the terms are usually for not more than 18 months. The near absence of intermediate and long-term credit makes capital goods purchases extremely difficult for Northeast farmers, even for such small items as ox plows, hand planters, sprayers, etc.

The first column in Table 7.4 shows the percentage of respondents who were landowners for each commodity. Since the IBRA (Brazilian Land Reform Agency) property lists were used as the sampling population, most of the interviews were made with landowners. This was desirable for a marketing study since the owners generally make the important marketing decisions affecting the farm sales and purchases.

However, each landowner was asked if he had sharecroppers or renters and how many he had. In addition, each was asked if he had relatives using some land without paying rent. The results are shown in Table 7.4. Sharecropping appears to be most common among rice and cotton farmers and less common for beans and manioc. For those having sharecroppers the average number per rice landowner in Codó was 27.0 and in São Francisco was 13.3. Cotton farmers averaged 3.7 sharecroppers and bean and manioc farmers followed with slightly less. More than 10% of the farmers had relatives

Table 7.4 Land Tenure Arrangements in Farm Survey, by Commodity, 1967

Producer Group	Percent Land Owners	Percent of Landowners With Renters or Sharecroppers	Percent of Landowners With Relatives Using Land Free	Average Number of Sharecroppers Per Landowner Having Sharecroppers	Percent of Landowners With Sharecroppers Who Used a Half-Share Arrangement
Rice:					
Codó	59.3	48.2	29.6	27.0	7.7
São Francisco	86.6	19.7	18.1	13.3	91.2
Beans:					
Irecê	98.0	12.3	10.2	2.5	100.0
Al-Pe	99.2	7.0	18.7	3.9	22.2
Manioc	91.4	10.0	15.2	2.8	40.0
Cotton	92.1	29.1	18.8	3.7	64.6
Milk	97.6	N.A.	0	N.A.	N.A.

SOURCE: SUDENE/MSU Farm Survey (1967).

using land without charge and rice and cotton farmers again showed higher percentages than manioc and bean producers.

The most common sharecropper arrangement is equal shares. In other words, the sharecropper gives half his production to the landowner and keeps the remaining half for himself. The usual agreement also requires that the sharecropper sell to the landowner any part of his share which is not consumed. The sharecropper must sell this part at harvest time when prices are lowest. If the sharecropper does not sell to the landlord, he will generally be removed from the land the following year. Thus, the plight of the sharecropper is serious and merits study. However, the present marketing study was not designed to deal in depth with that particular problem.

Assemblers

The agricultural commodities covered in this study are produced on many small farms widely scattered geographically, poorly linked with urban consuming centers and with other rural consumer markets. "Assemblers" perform the functions of buying small lots of commodities, assembling them for sale in local markets for forwarding to distant markets. In carrying out these functions, assemblers assume the risk of ownership and add to the value of the commodities by creating place utility. Assemblers may also contribute time utility through storage activities and may add to form utility by sorting, grading and processing commodities. In Brazilian commodity markets, assemblers are also deeply involved in providing credit to both producers and small assemblers.

Assemblers are relatively heterogeneous in their operating characteristics. It may be helpful to roughly classify them into subgroups based on the nature of their activities. The categories described below are most applicable to rice and bean assembly operators but are also partially applicable to other commodities such as manioc and cotton. "Processor assemblers" are excluded from this list of types.

"Gatherers" are often farmers who buy from their neighbors and add these products to their own before going to local trading centers. Also included in this category are ox cart owners or mulerunners *(tropeiros)*, who pick up bags of products as they pass small farms on their way to the local village.

"The Country Store," located at a crossroads or in a small village, may buy commodities or trade basic necessities such as kerosene, salt and matches for the commodity.

"*Feira* Assemblers" buy commodities in small quantities in rural *feiras* and resell locally. They may also rent a truck together with other assemblers to sell their merchandise in the city.

"Trucker Assemblers" travel from market to market using either their own or rented trucks, dealing in 6-to 8-ton lots, buying in rural areas and selling in cities.

"Local Assemblers" or "Town Buyers" are specialized commodity buyers with established places of business in a local trading center. These buyers are more likely to extend credit to producers and to store significant quantities of commodities.

"Large Coordinated Assemblers" are usually headquartered in convergence centers. They buy principally from assemblers in rural trading areas who can provide relatively large lots of products.

Personal and Demographic Characteristics

The foregoing discussion has presented a general introduction to some of the economic characteristics of farmers and assemblers. The purpose of the following is to look more closely at some of the more important personal characteristics of these two groups. In most cases, self-explanatory tables are used with verbal comment focused mainly on the significant relationships and differences among commodity groups or between farmers and assemblers.

Age

Table 7.5 shows that there was little difference in the average ages of farmer and assembler groups. The over-all average of 45 years seemed to be representative of all groups, with the possible exception of manioc assemblers, where the average was only 38.

Education and Literacy

Assemblers exhibited a significantly higher level of education and literacy than farmers. The percentage of assemblers havign attended school ranged from 72% in the bean areas to 97% in the rice areas. The range for farmers went from 47% of bean farmers in the Pernambuco-Alagoas (Pe-Al) area to 78% of the milk producers. Data on average years of education are not available for assemblers, but the farmer results are closely related to the figures just cited for the percentage attending school, with dairy farmers showing the largest average number of years of education (5.0).

Table 7.5 Some Personal Characteristics of Producers and Assemblers, by Commodity, 1967

Commodity	Personal Characteristics									
	Average Age (Years)		Attended[a] School (Percent)		Average Years Education for Those Who Attended School		Percent Able to Read and Understand Sentence		Average Number in Household	
	Farmer	Assembler	Farmer	Assembler	Farmer	Assembler	Farmer	Assembler	Farmer	Assembler
Rice:										
Codó	44	47	56	97	2.7	N.A.	37	72	6.8	9.0
São Francisco	48		70		4.0		52			
Beans:										
Irecê	45	43	71	72	2.9	N.A.	48	85	7.5	7.5
Pe-Al	45		47		3.6		27			
Manioc	48	38	57	80	2.6	N.A.	31	49	6.9	6.3
Cotton	49	45	56	79	2.4	N.A.	34	74	7.4	8.2
Milk	47	b	78	b	5.0	b	56	b	7.7	b
All Farmers[a]	47	--	58	--	3.0	--	37	--	7.5	--
All Assem.	--	45	--	82	--	N.A.	--	71	--	7.9

[a]Dairy farmers excluded.

[b]Interviews were not conducted among milk assemblers.

SOURCE: SUDENE/MSU Surveys (1967).

Family Size

It appears that assemblers have slightly larger families than farmers, with the general level of both farmers and assemblers exceeding six persons per household (Table 7.5). The averages given in Table 7.5 may include relatives or friends living with the family, since respondents were asked to give the total number of people living in their household.

Interrelationships Between Personal Characteristics

A series of chi-square tests were performed in order to test the strength of relationships between the above-mentioned variables for each commodity. There were few statistically significant relationships between education and literacy; the only consistent relationships were between age and size of household. Age, in general, was not significantly related to education nor to mass media exposure. Nor was education significantly related to either size of household or mass media exposure for any of the tested relationships. This suggests the hypothesis that this lack of statistically significant relationships was due to the low absolute level of education and mass media usage and to the homogeneity of the population in all the above-mentioned variables.

Geographic Mobility

Assemblers appear to be more mobile than farmers (Table 7.6). Among farmers, cotton producers are least likely and Codó rice producers are most likely to have been born in another *município* or state. Rice assemblers are also the most mobile of the five commodity buyers due, no doubt, to the high number of migrants in the Maranhão area.

Behavior

In most cases, assemblers have greater exposure than farmers to mass communication messages. Table 7.7 shows that assemblers more frequently read magazines and newspapers and are more likely to possess a functioning radio, watch television and attend movies. However, it is interesting to note that a smaller percentage of manioc and cotton assemblers listen to the radio than do their farmer counterparts. Similarly, a smaller percentage of cotton assemblers watch television than do cotton farmers. The high percentage for these farmer groups may be due to respondent bias or,

Table 7.6 Distribution of Birthplaces among Producer and Assembler Groups, 1967 (percent)

Producer Group	Birthplace									
	This[a] *Municipio*		Other[b] *Municipio*		Other State		Other		Total	
	Farmer	Assembler	Farmer	Assembler	Farmer	Assembler	Farmer	Assembler	Farmer	Assembler
Rice:										
Codó	25.9	36.0	22.2	21.5	48.1	42.4	3.7	0	100.0	100.0
São Francisco	72.4		19.5		7.3		0.8		100.0	
Beans:										
Irecê	59.2	51.5	34.7	26.0	6.1	22.4	0	0	100.0	100.0
Pe-Al	66.4		19.5		11.7		2.3	0	100.0	
Manioc	70.7	40.3	27.3	59.7	1.3	0	0.7	0	100.0	100.0
Cotton	79.4	62.2	14.5	33.1	6.1	4.7	0	0	100.0	100.0
Milk	72.2	b	20.6	b	5.6	b	1.6	b	100.0	100.0
All Producers[a]	69.6	--	21.3	--	8.1	--	1.0	--	100.0	100.0
All Assem.[a]	--	46.7	--	34.1	--	19.3	--	--	100.0	100.0

[a]Milk excluded.

[b]Interviews were not conducted among milk assemblers.

SOURCE: SUDENE/MSU Farm Survey (1967).

Table 7.7 Communication Characteristics of Farmers and Assemblers by Commodity, 1967

Commodity	Communication Characteristics											
	Percent Read Magazine or Newspaper Lately		Percent Having Functioning Radio		Percent Listen to Radio Sometimes		Percent Watch Television Sometimes		Percent Attend Movies Sometimes		Percent Attended Extension Meeting Before	
	Farmer	Assem.	Farmer	Assem.	Farmer	Assem.	Farmer	Assem.	Farmer	Assem.	Farmer	Assem.
Rice:												
Codó	33.3	55.4	51.9	98.3	81.4	100.0	66.7	81.7	33.3	90.3	7.4	N.A.
São Francisco	38.2		76.4		89.4		40.6		57.7		19.5	
Beans:												
Irecê	36.7	40.0	65.3	84.7	91.9	93.4	38.8	56.1	26.5	79.1	26.5	N.A.
Pe-Al	35.2		50.8		82.9		28.2		27.3		16.4	
Manioc	23.3	44.6	56.7	79.6	87.4	66.6	65.6	91.7	17.3	80.6	10.7	N.A.
Cotton	21.2	52.4	52.7	86.0	95.2	51.6	72.7	66.6	27.3	82.9	9.7	N.A.
Milk	50.5	b	88.8	b	97.5	b	84.1	b	44.4	b	44.8	N.A.
All[a] (Total)	29.4	47.7	58.7	87.4	88.9	99.1	40.2	73.4	28.0	82.9	14.3	N.A.

[a]Milk excluded.

[b]Interviews were not conducted among milk assemblers.

SOURCE: SUDENE/MSU Surveys (1967).

more likely, is due to the fact that they visit friends or relatives to listen to their radios or watch their televisions.

Only 14% of farmers in the sample have ever attended a farm extension meeting. Rice farmers in São Francisco, bean farmers in Irecê and milk producers had the highest percentage participation in some kind of extension program.

These results suggest that for both farmers and assemblers the radio is the most important mass communication medium. This medium might be effectively utilized to provide crop forecast information, day-to-day market news, information on modern farm methods and inputs, and other related information. At present, little or no such farm information is disseminated through radio broadcasts.

Rice, bean and cotton producers most frequently obtain market news from their buyers (Table 7.8). Manioc farmers usually gather market information by personal observation in the *feiras*. The major market news source for milk producers is neighbors. Assemblers also obtain market information most frequently from their assembler colleagues or from neighbors, but, in all cases, personal observation in markets or *feiras* was a close second in terms of percentage response. It is clear that most market information in the system is transmitted by word of mouth with all the inefficiencies and errors related thereto. It is also apparent that a high percentage of all farmers (57.9%) rely principally on their buyers for market news. This potentially gives the assembler a significant information advantage over the farmer. However, assemblers themselves have only indirect or infrequent news from larger markets and thus are handicapped in their business operations.

Illness

Farmers in the survey were asked to give the number of days in 1966 on which they were unable to work due to illness. Information on illness was not collected from assemblers. The percentage of farmers reporting at least one day of illness in 1966 ranged from 27% for milk producers to 57% for São Francisco rice producers (Table 7.9). These percentages do not appear to be particularly high.

Average days ill, however, for those reporting any kind of sickness, suggest that illness could have adversely affected farm income by preventing work at critical times during the year. The average days ill ranged from 38 for milk producers to 74 for Irecê

Table 7.8 Sources of Price Information for Farmers and Assemblers, by Commodity, 1967

Commodity	Percentage of all Respondents Using Different Sources of Information									
	Other or No Information		Observation in Market or *Feira*		Telegram, Shortwave or Regular Radio		Colleague or Neighbor		Buyers	
	Farmer	Assembler	Farmer	Assembler	Farmer	Assembler	Farmer	Assembler	Farmer	Assembler
Rice:										
Codó	3.7	7.2	0.0	31.0	3.7	11.9	7.4	40.5	85.2	9.5
São Francisco	2.4		7.1		.8		18.1		70.1	
Beans:										
Irecê	N.A.	4.6	4.1	40.3	2.0	2.0	22.4	48.0	63.3	5.1
Pe-Al	.8		18.8		0.0		11.7		67.2	
Manioc	.7	1.4	60.7	34.0	0.0	0.0	9.4	64.6	29.3	0.0
Cotton	.6	4.7	24.2	34.9	.6	8.5	12.7	40.3	61.2	11.6
Milk	0.0	N.A.	27.8	N.A.	8.3	N.A.	38.9	N.A.	8.3	N.A.
All	1.1	3.4	25.7	25.7	.6	6.5	13.3	49.3	57.9	5.4

SOURCE: SUDENE/MSU Surveys (1967).

Table 7.9 Illness among Farmers by Commodity, 1967

Commodity	Percent Ill During 1966	Average Days Sick for Those Reporting Illness in 1966	Median Days Sick for Those Reporting Illness in 1966	Percent all Farmers Sick More Than 20 Days, 1966
Rice:				
Codó	56	44	27	48
São Francisco	57	68	26	33
Beans:				
Irecê	35	74	30	25
Pe-Al	41	48	19	20
Manioc	49	44	27	31
Cotton	36	65	17	16
Milk	27	38	22	17
All Farmers[a]	45	57	26	26

SOURCE: SUDENE/MSU Surveys (1967).

bean farmers. The median number of days ill is in all cases significantly lower than the average. A study of the frequency distribution indicates that a few very high values tended to raise the average. The median is, therefore, considered a more representative estimate of the number of days ill.

The last column is probably more useful as an indicator of the impact of illness on farm operations. It shows the percentage of all farmers who were sick more than 20 days in 1966. Since most farmers in this study are semi-idle about six months out of the year due to the seasonality of their major farm enterprises, an average of ten days ill during that period would not materially affect farm productivity or prevent farm output expansion if the farmer had the resources. The remaining ten days would, on the average, fall during the six months of major farm activity. It might also be expected that those ten days would normally be scattered through the period rather than bunched together. Thus, farm productivity might not be greatly reduced by 20 days of illness during the year. The percentage of farmers ill more than 20 days ranges from only 17% for cotton farmers to 48.1% for Codó rice farmers.

Attitudes

One of the most important factors determining the willingness of an individual to change his management methods, adopt new ideas, or invest in expanding his business, is the set of values held by that individual. These values will be reflected by the attitudes he takes toward certain kinds of actions or things. Thus, the individual's basic values about what is good in life will be reflected in his attitudes or actions toward a wide variety of hypothetical or real life situations. It is important to understand something about the preference pattern or values of any group before beginning extensive planning of development programs for that group. For that reason, a series of statements was formulated on each of four different classes of attitudes. Respondents were asked to indicate whether they agreed, disagreed, or had no opinion. The results are presented and discussed below.

Deferred Gratification

For the individual in any business to achieve an improvement in his level of income, two kinds of resources are usually required--labor and capital. The individual must be willing to sacrifice

some current income in order to save for future investment, and he must be willing to supplement that capital investment with appropriate labor and management efforts. The attitudes of individuals or groups of individuals toward current vs future gratification become important in ascertaining the possible ways of identifying and assisting those groups or individuals who are most willing to help themselves. There should be no illusion that the two statements utilized in this study do a perfect or near-perfect job of separating individuals into groups of high and low willingness to defer consumption. To date, no such technique has been developed. Moreover, due to differences in economic levels which may require that low income families consume all they make, and due to a variety of other intervening variables, it is difficult to hold other things constant and sort out the real willingness of an individual to defer satisfaction. Nevertheless, perhaps even imperfect knowledge is preferable to ignoring these important relationships.

In general, both farmers and assemblers prefer to receive a gift of NCr$30 today rather than NCr$90 a year from now (Table 7.10). Among farm groups, Pe-Al bean producers and manioc farmers seem to be the least willing to delay gratification, while dairy farmers show a greater willingness to postpone consumption. This ranking is similar to the total farm sales ranking and undoubtedly reflects the fact that milk farmers feel they can afford to delay gratification, while manioc and bean farmers with considerably lower incomes feel they must provide first for the necessities of today before worrying about the future. The positive time preference of farmers and assemblers was further indicated by the large percentage who agreed that "it is better to live for today because tomorrow will work itself out anyway" (Table 7.10).

Interpersonal Trust

Economic growth in a private enterprise economy is greatly affected by the degree of trust held by its businessmen in each other and in the government agencies, laws and other institutions set up to facilitate economic exchange and encourage business confidence. Improvements in marketing efficiency often hinge on the willingness of participants to accept without personal observation another's word on quality, price or other market conditions. Moreover, experience in developed countries shows that the pooling of resources into partnerships, corporations or cooperatives is an important way of capturing economies of scale in production and

Table 7.10 Percentage of Farmers and Assemblers Agreeing with Selected Attitude Statements about Deferring Satisfaction, by Commodity, 1967

Commodity	Statements			
	It is better to receive NCr$90 one year from now than NCr$30 today (Percent)		It is better to live for today because tomorrow will work itself out anyway (Percent)	
	Farmers	Assemblers	Farmers	Assemblers
Rice:				
Codó	33.0	46.5	59.0	44.6
São Francisco	44.0		66.0	
Beans:				
Irecê	22.0	26.5	35.0	51.0
Pe-Al	27.0		63.0	
Manioc	38.0	41.0	60.0	45.8
Cotton	44.8	51.9	55.2	41.9
Milk	39.7	a	44.4	a
All	37.3	39.8	58.7	46.5

[a]Interviews were not conducted among milk assemblers.

SOURCE: SUDENE/MSU Surveys (1967).

marketing which would require more capital than most individual businessmen or farmers could muster. But the formation of such groups is difficult and unlikely where men are unable to trust one another to be honest.

Table 7.11 shows the percentage of farmers agreeing with three statements directed toward different aspects of interpersonal trust. For all three statements, assemblers indicate less willingness than farmers to trust others, especially those outside the family. Among assemblers, it is difficult to identify the group with a smaller propensity to trust, though rice assemblers show considerably less trust than the others on the first and third statements, while showing the highest agreement that one can join partnerships with non-relatives. A similar situation arises with farmers, making it difficult to identify one farmer group as having more or less trust than the others.

While a strong correlation had been expected among the responses to the three statements, it is not surprising that such relations did not exist. Each question focused on a slightly different aspect of trust, which itself is a many-sided concept. Hence, a person might respond in one way to a general statement on trust in others but feel quite differently about investing in a partnership or working with others. It is significant, however, that assemblers exhibit less willingness to trust others than farmers. These results suggest that assemblers' lack of confidence in others may be holding back marketing improvements.

Fatalism

The previous two categories of attitudes focused on important values affecting the way an individual might respond if his economic position permitted. The set of questions grouped together here under the title "fatalism" take a slightly different orientation. The purpose here is to discover the amount of self-confidence of the individual, his feelings about the possibility that he, not some outside force, can make things better.

It should be pointed out that the third statement in Table 7.12 measures a slightly different aspect of fatalism in that it is designed to show the level of confidence of farmers and assemblers in the ability of their government to solve problems which they face as individuals. Once again, the reader should realize that other variables intervene to affect the responses to these statements. The most important such variables are net worth and

Table 7.11 Percentage of Farmers and Assemblers Agreeing with Selected Attitude Statements about Interpersonal Trust, by Commodity, 1967

Commodity	Statements					
	One can trust equally in relatives and in other people (Percent)		One can join in partnerships with other people even if they are not members of our family (Percent)		One may lose much money when working with others (Percent)	
	Farmers	Assemblers	Farmers	Assemblers	Farmers	Assemblers
Rice:						
Codó	70.0	26.3	63.0	66.9	52.0	52.0
São Francisco	44.0		71.0		42.0	
Beans:						
Irecê	51.0	56.6	82.0	64.8	40.0	37.8
Pe-Al	57.0		68.0		33.0	
Manioc	45.3	33.3	74.7	45.1	43.3	34.0
Cotton	69.7	51.2	66.1	59.7	43.0	46.5
Milk	51.6	N.A.	73.0	N.A.	53.2	N.A.
All	55.1	42.0	70.4	60.4	41.2	42.7

SOURCE: SUDENE/MSU Surveys (1967).

Table 7.12 Percentage of Farmers and Assemblers Agreeing with Selected Attitude Statements on Fatalism, by Commodity, 1967

Commodity	Statements					
	To make more money, it is better to know how to do business than to be lucky (Percent)		Nowadays the farmer (assembler) alone cannot do much to improve his life (Percent)		Farmers (assemblers) can count on the government to solve their problems (Percent)	
	Farmers	Assemblers	Farmers	Assemblers	Farmers	Assemblers
Rice:						
Codó	48.0	64.7	89.0	71.4	89.0	60.6
São Francisco	55.0		67.0		86.0	
Beans:						
Irecê	49.0	53.1	98.0	49.5	77.0	63.7
Pe-Al	45.0		74.0		84.0	
Manioc	46.0	40.3	89.3	80.6	80.0	93.1
Cotton	41.8	65.1	87.3	69.0	79.4	75.2
Milk	65.1	N.A.	92.9	N.A.	81.7	N.A.
All	46.7	55.8	82.0	66.7	82.0	71.8

SOURCE: SUDENE/MSU Surveys (1967).

current income. Obviously the individual with greater wealth is in a stronger position to determine his future than are others.

In general, responses to the first two statements reflect a less fatalistic attitude by assemblers than by farmers, but for both groups the absolute levels of response indicate a good bit of dependence on luck or fate. It is also interesting to note that on both statements dairy farmers show less fatalism than manioc assemblers.

There is a good bit more awareness among assemblers of the importance of management know-how than among farmers. In addition, almost all farmers feel that there is nothing that they, as individuals, can do to improve their lives.

Finally, both farmers and assemblers show high levels of agreement that government will help them out. This high agreement may involve some respondent bias, since the interviewer could have been perceived as an employee of the government.

Familism

The final group of attitude statements deals with the family. The two statements in Table 7.13 focus on completely separate kinds of attitudes toward the family. The first is designed to reflect the respondent's feelings toward moving away from his parents. Since labor mobility from rural to urban areas is an absolute necessity in the economic development process, it is important to explore the factors which might potentially inhibit labor mobility. The second statement is intended to give an idea of the respondents' feeling toward larger or smaller families. Since rapid population growth is a problem in most developing nations, it is important that individual families begin to realize the need and the means of limiting births.

Both assemblers and farmers showed a strong preference to live near their parents even if it meant smaller incomes. Rice and cotton assemblers showed somewhat less propensity to stay near their families than did their farmer counterparts. It is obvious that migration by assemblers and farmers from rural areas will be hampered by family ties and at the least will require a promise of significantly better incomes than are available in rural areas. On the other hand, given the rapid population growth of urban areas and the high rate of unemployment which is concentrated principally in migrant groups, the drag on migration caused by family ties may be a blessing in disguise, especially in the short run.

Table 7.13 Percentage of Farmers and Assemblers Agreeing with Selected Attitude Statements about Familism, by Commodity, 1967

	Statements			
	It is better to have a job which pays little close to our parents than to earn more in a distant place (Percent)		Today it is better to have a small family than a large one (Percent)	
	Farmers	Assemblers	Farmers	Assemblers
Rice:				
Codó	82.0	64.6	56.0	75.4
São Francisco	84.0		62.0	
Beans:				
Irecê	81.0	82.0	48.0	54.1
Pe-Al	86.0		53.0	
Manioc	84.7	84.7	60.7	61.1
Cotton	87.3	68.2	60.0	65.1
Milk	76.2	a	72.2	a
All	85.0	75.3	58.1	63.8

[a]Interviews were not conducted among milk assemblers.

SOURCE: SUDENE/MSU Surveys (1967).

In most cases, a slim majority of farmers and assemblers indicated a preference for small families. There are no clear patterns between farmers and assemblers or among the groups. Nor does the absolute level of response suggest that any strong feeling for reducing family sizes has developed in these rural areas.

Summary

A total of 774 farmer interviews and 169 assembler interviews provided the data base for this analysis. The farmers were randomly selected for each of four commodities using local tax lists of landowners as the sampling frame. A sample of 126 dairy farmers was drawn from a list of shippers to Recife's only milk pasteurizing plant.

The average size of farm varied from 19 hectares for manioc producers to 444 hectares for rice producers in Maranhão. The median-size farm was less than 100 hectares and the median value per farm was NCr$6000. The percentage of farmers having share-croppers ranged downward from 48% for Maranhão rice producers to 29% for cotton, 20% for São Francisco rice producers, and 10% or less for bean and manioc producers.

Assemblers are a heterogeneous group ranging from large buyers located in convergence centers to farmers who buy products from their neighbors before going to local trading centers.

The level of education and literacy is relatively low throughout the rural area and represents a major barrier to modernization. Although a high percentage of farmers have attended school, only 37% were able to read and understand a simple sentence submitted to them during the interviews. The highest literacy level was found among milk producers, rice producers in the São Francisco area, and bean producers in Irecê. Assemblers tended to have more education than farmers, with 71% being literate based upon the single-sentence reading test.

Farmers are not well integrated into modern society by mass communication media. Less than one-half had read newspapers or magazines recently; 59% had functioning radios; 28% had attended an extension meeting. Most farmers rely on the product buyers for market information, but these assemblers are served by rather tenuous information networks based mostly on informal interpersonal communications.

Poor health reduced farm labor productivity. Of the farmers interviewed, 36% had been ill and unable to work for more than 20 days during 1966.

Farmers and assemblers tend to be traditional and homogeneous in their attitudes toward modernization concepts. A very high percentage have little confidence in the possibility of improving their lives by their own individual efforts. However, a high percentage agreed that they can count on the government to solve their problems. More than one-half of the farmers and assemblers revealed very high preference for present income over future income coupled with an attitude of living today because tomorrow will work itself out anyway.

About one-half of the farmers felt they could trust people other than relatives. Assemblers were less trusting of nonrelatives than were farmers. A very high percentage of both farmers and assemblers evidenced reluctance to migrate to a distant place even if there might be a better-paying job there.

In reviewing personal characteristics and attitude measures, it has been possible to identify the conditions that will determine the kinds of modernization programs that can be successfully introduced into the rural areas of Northeast Brazil. Also, there is enough difference between farmers in the different commodity studies to suggest that short-run gains in agricultural modernization could probably proceed more rapidly in the São Francisco rice areas and among milk and bean producers than in the manioc and cotton producing areas. This observation will be further reinforced by evidence presented in Chapters 8 and 9.

CHAPTER 8

FARM PRODUCTION CHARACTERISTICS, USE OF PURCHASED FARM INPUTS AND CONSUMPTION ACTIVITIES

Introduction

In the first part of the previous chapter it was stated that the expanded use of modern agricultural methods and inputs could lower consumer food prices and contribute to over-all economic growth. It should be stressed that for most developing nations such a revolution in agricultural production methods is a necessary condition for sustained economic development.

This chapter will focus on three different aspects of this revolution for the five farm groups being studied: (1) cultural practices and inputs currently being used; (2) distribution of modern inputs in rural areas; and (3) farmer use of consumer goods. The first part of the chapter will deal with current farm practices and their interrelationships. Some space will also be given toward an effort to identify characteristics of farmers with a willingness to change from traditional to modern methods. The last two sections of the chapter focus on the role which rural markets can play in a further linkage of the urban and rural areas.

The specific linkages to be considered here are those between the urban industrial sector and the rural market for consumer goods and factor inputs. The rural areas can serve as the mass consumer market which makes possible the achievement of scale economies so frequently absent among "infant industries" in developing countries. The availability and sales of consumer goods can provide the additional motivation for earning higher incomes among rural consumers. In addition, the sales of modern factor inputs are the mechanism through which higher incomes become possible.

The Nature of Farm Production

A comparative discussion of characteristics of the sample survey farms for the five selected commodities will be presented, focusing on the similarities and differences among the groups and

directing the reader toward significant findings and conclusions. In addition, statistically and economically significant relationships between certain of the variables under study will be pointed out.

Hectares Planted

Table 8.1 shows the average number of hectares planted to the principal crop in each of the survey areas. Rice and bean plantings are, in general, significantly larger than manioc and cotton. Plantings of pasture grasses by dairy farmers are, in an absolute sense, relatively low, but have gone up 160% since 1965. The average size of bean plantings in Irecê does not seem to differ greatly from the Alagoas-Pernambuco area, although there seemed to have been greater fluctuation during the three years observed. On the other hand, São Francisco rice producers had significantly larger plantings than Codó farmers. Moreover, there was an increase in both 1966 and 1967 which amounted to almost 10%. It should be noted that, in most cases, beans are interplanted with corn and, in the cotton producing areas, both beans and corn are found among the cotton plants.

Table 8.1 Average Area Planted to Principal Crops by Commodity, 1965-1966

Commodity	Average Hectares Planted			
	1965	1966	1967	% Change 1965-67
Rice:				
Codó	11.3	10.5	11.0	-2.7
São Francisco	18.1	19.0	19.9	9.9
Beans:				
Irecê	12.6	13.5	9.2	-2.7
Al-Pe	10.3	12.0	12.3	19.4
Manioc	3.2	3.1	3.7	15.0
Cotton[a]	3.4	3.4	N.A.	N.A.
Milk[b]	2.5	3.9	6.5	160.0

[a]Since reference is to perennial tree cotton, these figures show new plantings (only) in given year.

[b]Figures give the average number of hectares of planted pasture.

SOURCE: SUDENE/MSU Farmer Survey (1967).

Given the nature of farm production methods, the average hectares planted by interviewed farmers may appear high as compared to the modal size of all farms. This is due partially to a few very large sample farmers who tend to pull up the average (arithmetic mean). In addition, the sample was restricted to landowners selling more than NCr$100.00 of farm products. This sampling procedure kept subsistence or semi-subsistence farmers out of the sample and resulted in landowners reporting on all the land they owned whether it was operated by themselves, sharecroppers, or cash renters.

Yields

Productivity is low on Northeast Brazilian farms. Average yields per hectare (or production per cow) are shown in Table 8.2. These yields are significantly lower than average yields for all of Brazil outside of the Northeast. Part, but my no means all, of this difference can be accounted for by unfavorable climatic and soil conditions in much of the Northeast in comparison to other parts of Brazil. Irrigation, where conditions permit, could offset part of that differential, but otherwise little can be done to improve the basic resources endowed by nature to the Northeast.

The second factor which accounts for the differences in farm productivity between the Northeast and the rest of Brazil is the combination of poor farming methods, inadequate use of modern inputs, and inadequate management skills which characterize Northeastern farmers. But these difficulties can largely be overcome if Northeastern farmers can be encouraged to use better farming methods, more productive technologies and more effective management techniques.

Average yields of São Francisco rice growers were almost twice as large as their counterparts in Codó, Maranhão, in both 1965 and 1966. This sharp contrast between these two producing areas in the Northeast illustrates the effect of improved production practices and new technologies on yield. It is evident from data presented later in this chapter that rice growers along the São Francisco River are much further advanced in the use of modern farming methods than are Codó rice growers.

Bean yields in the Alagoas-Pernambuco area (Al-Pe) showed an increase of almost 42% from 1965 to 1966, while Irecê bean farmers had an average increase of only 6%. This difference was largely due to favorable weather conditions in the Al-Pe area in 1966.

Table 8.2 Average Yields, by Commodity

Commodity and area	Average yields on farms of the Northeast in survey areas			Average yields for all Brazil, outside the Northeast, 1965
	1965	1966	% change	
Rice:[a]				1,679
Codó	1099	1095	-0.3	
São Francisco	1904	1981	4.0	
Beans:[b]				800
Irecê	488	516	5.7	
Al-Pe	464	658	41.8	
Manioc[c]	N.A.	1971	N.A.	3,560
Cotton[d]	317	247	-22.1	832
Milk[e]	N.A.	4.25	N.A.	N.A.

[a]Kilos unhulled rice per hectare.

[b]Kilos of beans per hectare.

[c]Kilos of manioc flour per hectare.

[d]Kilos of unginned cotton per hectare.

[e]Liters of milk per cow per day.

SOURCE: SUDENE/MSU Farmer Survey (1967) and Anuário Estatístico do Brasil (1965).

All farmers were asked how they would go about increasing their production without planting more land. The results are reported in Table 8.3. Two response categories stand out--use fertilizers and don't know. The percentage responding "don't know" ranged from 24% for São Francisco rice growers to 49% for Al-Pe bean producers. It is significant that such large numbers of farmers have no idea how to go about improving yields, even if they could afford it.

Generally, São Francisco rice farmers agree that fertilizers and mechanization are needed to improve their yields. Codó rice farmers, on the other hand, place much less emphasis on fertilizers and more on mechanization. Irecê bean farmers also tend to stress mechanization, especially emphasize specialization in bean production, and have little regard for fertilizers.

One-half of Al-Pe bean growers did not know how to increase yields, but 32% thought fertilizers could be used. Manioc farmers showed a response pattern similar to but even more exaggerated than that of Al-Pe bean producers, with a high percentage responding "don't know" and a 52% response for use of fertilizer. Finally, cotton farmers' responses were scattered among all alternatives, indicating uncertainty about what might be done to improve cotton yields.

In summary, these data suggest that many of the farmers surveyed lack information on economical ways to improve yields. Bean farmers show the least knowledge in this regard. Nevertheless, those farmers who did respond indicated a pattern which suggests certain conclusions:

1. Codó rice, Irecê bean, and cotton farmers lean more toward mechanization as a way of improving yields, with a scattering of other responses.

2. A majority of São Francisco rice, Al-Pe bean, and manioc farmers feel that fertilizers could improve yields, with mechanization next in importance.

3. About one-third of all producers did not know how to increase yields.

Producer Price Responsiveness

A series of questions was asked determining what might be the most likely producer response to different price conditions. A base price was determined for each commodity (usually the minimum price set for the government price stabilization program). Producers were then asked whether they would try to increase or decrease

Table 8.3 Farmer Opinions on Ways to Increase Yields, by Commodity, 1967

Commodity	Percent Responding								
	Other	Use Fertil-izers	Narrow Plant Spacing	Crop Special-ization	Insecti-cides	Irri-gation	Better speed	Mechani-zation	Do Not Know
Rice:									
Codó	.0	11.1	.0	7.4	.0	7.4	3.7	33.3	37
São Francisco	.8	46.8	3.1	2.4	.0	6.3	1.6	12.6	24.4
Beans:									
Irecê	2.0	4.1	.0	20.4	.0	8.2	4.1	14.3	46,9
Al-Pe	.0	32.0	4.7	2.3	.8	1.6	2.3	7.0	49.2
Manioc	.7	52.0	.7	2.7	.7	2.7	1.3	2.0	37.3
Cotton	20.6	7.9	1.8	6.7	4.2	3.0	3.6	12.1	40.0

SOURCE: SUDENE/MSU Farmer Survey (1967).

production if the expected market price went up or down to a specified level. They were also asked what they would do if before planting they were assured of receiving a specified price (which was at or slightly below the government minimum price level or, in some cases, at current market prices). The hypothesized prices for each commodity are given in footnote (a) of Table 8.4.

The percentage who would respond to an expected increase in prices by planting more land area to their principal crop ranged from 48% for manioc farmers to 84% for cotton producers (Table 8.4). In between were rice farmers, bean growers and milk producers, in that order. This supports the expectation that those farmers with marginal or idle land or with land in other uses which could be planted to a more profitable crop are the ones who would be able to plant more if prices went up. In general, cotton farmers as a group seem to have the most idle or marginal land, followed by milk, bean, rice (except in Codó, where additional land is free for the clearing) and finally manioc producers.

Another factor which would affect the farmers' ability to expand acreage is the availability of labor and capital. It is almost a certainty that most producers of all five commodities have limited capital resources and that some would have a labor shortage, especially during critical times in the growing season. The labor situation will be further examined later in this chapter. Manioc farmers face the most stringent labor and capital limitations, with milk producers probably having the greatest flexibility.

The same factors as identified above would determine the ability of a farmer to expand acreage in order to take advantage of a guaranteed price. In all cases, the percentage of farmers who would increase plantings with guaranteed prices was lower than the percentage who would expand plantings as regular market prices increased (Table 8.4). Milk producers, Codó rice producers and cotton producers showed the highest percentage response. Alagoas-Pernambuco bean producers and manioc producers evidenced the least response to a guaranteed price.

Farmers were then asked whether or not they would reduce the acres planted (or number of cows milked) if expected prices went down to a specified level. Rice farmers and Irecê bean producers appeared least willing to reduce acreage (Table 8.4). From 30% to 35% of the other crop producers would reduce plantings if prices went down, while 39% of the milk producers would reduce their output.

Table 8.4 Average Producer Response to Hypothesized Price Changes, by Commodity, 1967

Commodity	Percent who would increase acreage if price increased[a]	Percent who would increase acreage if government offered guaranteed price[a]	Percent who would decrease acreage if price decreased[a]
Rice:			
Codó	66.7	55.6	11.1
São Francisco	51.2	33.9	15.0
Beans:			
Irecê	b	38.8	20.8
Al-Pe	71.1	28.1	35.2
Manioc	48.0	36.0	35.0
Cotton	84.0	48.5	33.0
Milk	73.0	50.0	38.9

[a]Hypothesized prices were:

	Hypothesized Prices NCr$		
	Increase	Guaranteed	Decrease
Rice per 60 kg. bag	14.00	11.00	10.00
Beans per 60 kg. bag	20.00	15.30	14.00
Cotton per 15 kg. unginned cotton	7.00	5.20	4.50
Manioc flour per 50 kg. bag	8.00	6.00	5.80
Milk per liter	.28	.23	.18

[b]The hypothesized price increase to NCr$20.00 per 60 kg. bag in Irecê was actually below the market price and thus is not valid for this analysis.

SOURCE: SUDENE/MSU Farmer Survey (1967).

In summary, a high percentage of the producers would increase planted acreage in response to a price increase. Manioc and São Francisco rice producers are least inclined to do so. All farmers are more inclined to expand acreage in response to higher prices than to reduce acreage in response to lower prices. Rice producers (both areas) and Irecê bean growers are least inclined to reduce output in response to lower prices. A guaranteed price set at or slightly below the current year average price would induce more than one-third of the farmers to expand output.

Using the three price response questions discussed above, an index was calculated for each farmer. The index included the farmer's estimate of the change in the number of hectares (or liters of milk) which he expected to effect in response to the price change. A higher index value would reflect a greater willingness to change plantings with higher, lower, and more stable prices. A series of chi-square tests was conducted to test the null hypothesis that no relationships existed between this index and several other variables. Table 8.5 shows the relationships which were significant at the .05 level. It also gives the simple correlation coefficient when it is significant at the .05 level.

Table 8.5 Results of Chi-Square Tests Relating Supply-Price Response Index to Selected Variables by Commodity, 1967.

Commodity	Total Farm Sales, 1966	Innovation Index[a]	Modernity Index[b]
Rice	Yes (r=.15)	no	no
Beans	Yes (r=.23)	Yes (r=.19)	no
Manioc	Yes (r=.21)	no	no
Cotton	Yes (r=.37)	no	no
Milk	N.A.	N.A.	N.A.

[a]The innovation index reflects the number of modern farm practices which were being used by the respondent. These practices will be discussed later in this chapter. Higher index values indicate that the farmer is using more modern practices.

[b]The modernity index is made up of a series of attitude questions which were designed to reflect modern vs traditional values. These attitude statements were discussed individually at the end of the previous chapter. A higher index value should reflect more modern attitudes.

SOURCE: SUDENE/MSU Farmer Survey (1967).

The size of farm as measured by total farm sales was positively correlated with the supply-price response index for all 4 crop commodity groups tested. One may, therefore, conclude that the farmers who react to price changes by altering acreage planted are also more likely to have larger gross incomes. Neither of the other variables is consistently correlated with the supply-price response index for all commodities.

Labor

In the previous chapter it was noted that family size for all groups of producers in the study averages around seven persons. In order to find out how many of those are old enough to do productive work, farmers were asked how many in their families were over 12 years of age. The range was from 5.1 for milk farmers (who also had the largest families) to 4.1 for Al-Pe bean farmers (Table 8.6). In most cases, all those over 12 years of age are available for at least some farm work and the majority have no other employment. The average number per family with off-farm employment ranged from .22 for São Francisco rice farmers to zero for Irecê bean producers. This leaves a fairly large supply of family labor for farm and home needs.

Table 8.6 Average Persons in Household Over 12 Years of Age and Percentage of Farms Hiring Labor in 1966, by Commodity

Commodity	Number over 12 years of age	Average number of family who worked off the farm, 1966	% with some hired labor in 1966
Rice:			
Codó	4.2	.04	77.8
São Francisco	4.2	.22	89.8
Beans:			
Irecê	4.7	0.00	71.0
Al-Pe	4.1	.02	81.0
Manioc	4.4	.11	61.0
Cotton	5.0	.18	76.0
Milk	5.1	N.A.	61.0

SOURCE: SUDENE/MSU Farmer Survey (1967).

In addition, from 61 to 90% of the producers in the various commodity groups surveyed hired some additional labor in 1966. It

is likely that in most cases other than dairying the hired labor is concentrated in a fairly short period such as planting or harvest time and is, therefore, part-time rather than year-round help. This extra labor is frequently exchange labor with neighbors rather than cash wage labor.

Total Farm Sales

Milk farmers had by far the largest average gross farm sales (NCr$11,593) of all the commodity groups in 1966 (Table 8.7). Next came São Francisco producers, followed by Irecê bean producers and Codó rice farmers. Irecê bean producers had an average of almost NCr$1,000 more total sales than Al-Pe area producers. Manioc and cotton farmers had the lowest gross sales. In some cases, landowners may have included sales made for sharecroppers. It should be made clear that these are total farm sales. To arrive at net farm income it would be necessary to determine and subtract production costs and to take into account the value of goods produced and consumed on the farm.

Given the traditional production methods on most farms in the Northeast, out-of-pocket production costs are fairly low. Moreover, the farm usually includes a home, with a good share of the food needs produced on the farm. It seems likely, though difficult to determine with certainty, that farmers in these samples are more product-specialized than the average Northeastern farmer, and thus must purchase a larger share of their food from cash income. The average percentage of income spent on food was 19% for dairy farmers, 29% for rice farmers, and 65-75% for manioc, bean and cotton farmers. For the latter three groups, gross income left for non-food production costs and discretionary purchases is very limited.

Rice growers in the São Francisco area and manioc farmers are highly dependent on one product for their incomes (Table 8.7). Dairy farmers receive 98% of their gross income from livestock and milk sales. Cotton and bean farmers get more than one-half of their income from principal product sales, and each averages more than one-fourth of sales from livestock. Only Codó rice producers garner a significant share of the gross farm income from other product sales, due largely to their sales of *babaçú* nuts.[1]

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[1] Dunn & Bradstreet--an American private company with offices in Recife, Brazil, which maintains credit ratings and financial status of business firms for the benefit of its subscribers.

Table 8.7 Average Total Farm Sales and Percentage Composition of those Sales, by Commodity, 1966

Commodity	Average gross sales NCr$	Percent total sales by source			
		Major produce sales	Livestock sales	Other sales	Total sales
Rice:					
Codó	2100	28.2	28.3	42.9	100.00
São Francisco	6255	82.3	15.4	2.3	100.00
Beans:					
Irecê	2803	63.0	27.0	10.0	100.00
Al-Pe	1835	52.0	42.0	6.0	100.00
Manioc	1505	81.0	10.0	9.0	100.00
Cotton	1462	67.0	28.0	5.0	100.00
Milk	11,593	31.0	67.0	2.0	100.00

SOURCE: SUDENE/MSU Farmer Survey (1967).

Again chi-square tests were prepared to test for significant relationships between gross farm sales and other selected variables using a .05 level of significance. A strong relationship was found between gross sales and the innovation index for all commodity groups. The farmers with higher scores on the innovation index tended to have higher total farm sales. The relationship between gross sales and the modernity index was not found to be significant at the .05 level for any of the commodity groups.

Off-Farm Employment

A relatively small percentage of farmers in each farm survey group worked off their farms in 1966 (Table 8.8). The proportion ranged from none for Irecê bean growers to 16% for dairy farmers. Dairy farmers had the best-paying, largely full-time jobs. São Francisco rice farmers ranked next, followed by the others with much lower earnings and shorter employment periods. Some dairy farmers and possibly some bean growers are professionals, such as doctors and lawyers or businessmen. Manioc, cotton and Codó rice farmers are much more likely to work short periods for other farmers. These facts probably account for the differences in median income earned among farmer groups.

Table 8.8 Percentage of Farmers with Off-Farm Work, Average Months, and Average Off-Farm Income, by Commodity, 1966

Commodity	% with off-farm work	Average number months for those employed off-farm	Median off-farm income for those employed off-farm NCr$
Rice:			
Codó	14.8	5.0	60
São Francisco	15.0	8.9	850
Beans:			
Irecê	0.0	0.0	0
Al-Pe	8.0	6.6	150
Manioc	15.0	6.4	100
Cotton	6.1	7.0	150
Milk	16.0	11.6	1400

SOURCE: SUDENE/MSU Farmer Survey (1967).

Farm Credit

Credit plays an important role in helping farmers improve productivity and increase farm income by providing them with the means to purchase tools and equipment as well as fertilizer, seed and even food for the family. Of the sample farmers, a larger percentage of cotton farmers (69.1%) had used credit in 1966, with Codó rice growers having the lowest percentage of loans (7.4%) (Table 8.9). On the other hand, 63.8% of the São Francisco area rice producers had some form of credit, while only 36.7% of manioc farmers had a farm loan. Forty-five to fifty-five percent of bean and dairy farmers had loans.

Government banks were the most important sources of farm credit for all commodities. Credit co-ops ranked second, followed by relatives or friends, landowners or buyers, money lenders, and private banks (Table 8.9).

The average amount of credit in 1966 ranged from NCr$71 for Codó rice growers to NCr$6,396 for milk producers (Table 8.9). These averages include only those who had loans in 1966. Moreover, it appears that a few large loans in most cases have skewed the averages upward.

Farmers were asked the amount of interest paid on each loan. Average interest rates were then computed, along with average total credit volume. The average interest rates vary from a low of .7% per month to 1.6% per month. These interest rates seem very low for Brazil, where inflation has recently averaged about 3% per month. These low rates were no doubt influenced by low-cost subsidized government credit, but even that usually ranges from 1 to 1.5% per month. It is, therefore, possible that farmers either systematically overstated total credit volume, understated interest charges, or both.

Virtually all loans to farmers in the sample were for less than 12 months. Little intermediate or long-term credit is offered to Northeastern farmers. Most loans range from 3 to 10 months, depending on the length of the growing season for the commodity or the short-term credit needs for family food purchases during the latter part of the production cycle.

When farmers who used credit were asked why they had not obtained larger amounts, the principal reasons were lack of available credit and inability to repay larger loans (Table 8.10). Perceived lack of credit availability seems to be particularly important for São Francisco rice growers and both groups of bean growers.

Table 8.9 Selected Credit Characteristics of Farmers, by Commodity, 1966

Commodity	Percent farmers with loans	Sources of Farm Loans--Percentage of all farmers[a]						Average total amount of loans in 1966 NCr$	Average monthly interest rate	Average length of loans in months
		Government bank	Private bank	Relative, friend or other	Land owner or buyer	Money lender	Credit co-ops			
Rice:										
Codó	7.4	0.0	0.0	3.7	0.0	3.7	0.0	71	N.A.	3-4
São Francisco	63.8	40.2	3.1	7.0	8.6	3.9	0.0	5725	1.0	3-5
Beans:										
Irecê	53.1	33.3	2.1	4.2	0.0	4.2	8.3	2747	.7	3-10
Al-Pe	47.7	25.8	0.0	4.7	3.1	4.7	7.0	1393	.7	3-5
Manioc	36.7	17.3	0.0	4.0	2.7	1.3	11.3	1575	1.3	1-4
Cotton	68.5	27.3	1.8	9.0	10.3	4.2	18.8	1736	1.6	4-6
Milk	54.8	39.8	0.0	4.3	0.0	0.0	11.7	6396	1.0	8-10

[a]The totals for all loan sources will not exceed the percentage of those commodities having loans since the base is all farmers.

SOURCE: SUDENE/MSU Farm Survey (1967).

Table 8.10 Reasons for not Borrowing in Last Year, Producer Attitudes toward Additional Credit, and Possible Uses of More Credit if Available, by Commodity, 1967

Commodity	% of total who had loans	Why borrowers did not obtain larger quantities of credit (% response each)[a]				% of total who did not borrow	Why non-borrowers did not use credit (% response each)[b]				Average amount of credit desired at 20% interest rate
		Credit not available	Collateral not sufficient	Unable to repay	No good use for additional credit		Could not get credit	No need for credit	Afraid to accept risk of credit	Already have an overdue loan or other	
Rice:											NCr$
Codó	7.4	0.0	7.4	0.0	0.0	92.6	59.3	14.8	3.7	0.0	2232
São Francisco	63.8	25.2	15.0	7.9	7.1	36.2	11.0	16.5	3.1	3.1	7360
Beans:											
Irecê	53.1	20.4	6.1	16.3	4.1	49.0	16.3	14.3	14.3	2.0	5194
Al-Pe	47.7	17.2	9.4	14.1	7.0	52.3	16.4	16.4	12.5	1.6	2582
Manioc	36.7	8.0	7.3	16.0	3.3	63.3	22.7	12.0	26.7	1.3	1168
Cotton	68.5	13.9	13.9	25.5	12.1	31.5	4.8	12.1	12.7	0.0	1855
Milk	54.8	12.0	10.0	14.0	14.0	45.2	7.0	25.0	11.0	2.0	8715

[a] The sum of the percentages for all reasons will not exceed the percentage who had loans since the basis of calculation was all farmers for each commodity.

[b] The sum of the percentages for all reasons will not exceed the percentage who did not borrow since the basis of calculation was all farmers for each commodity.

SOURCE: SUDENE/MSU Farmer Survey (1967).

Inability to repay or insufficient collateral were important reasons why cotton, manioc and milk producers could not obtain more credit.

Non-borrowers were asked to state why they had not used farm credit in 1966. The results (Table 8.10) suggest that Codó rice farmers and manioc producers have the most difficulty obtaining loans. This is no doubt caused by their low capital assets and the relative unprofitability of farming in those two areas. Manioc farmers also showed a strong fear of the risk involved in accepting loans. On the other hand, dairy farmers seemed to be able to get all the credit they needed, as evidenced by the fact that 25% had no need for farm loans.

Finally, all farmers were asked how much farm credit they would desire if it were available at an interest rate of 20% per year (this is still less than the recent rates of inflation). The ranking among commodity groups follows the same pattern as average farm capital values and total farm sales, with dairy farmers wanting NCr$8715.03 and manioc growers requesting an average of NCr$1168.46.

Chi-square tables were prepared to test the relationship between the innovation index scores and the amount of money a farmer would like to borrow at 20% per year. A significant relationship at the .05 level was found for both rice and bean farmers, indicating that the more innovative farmers were more likely to see a need for additional credit than the less innovative farmers. The relationship was not significant for manioc and cotton farmers and the test could not be performed for milk producers.

Cultivation Practices

In general, production methods remain quite simple for the commodities considered in this report. Few improved varieties have been developed. Most cultivating is done by hoe, and harvesting methods are primitive. Since each commodity has different characteristics, a separate discussion is given below for the five.

Rice - The general practices followed in rice cultivation are different in the two areas studied. In the São Francisco area, rice seeds are planted in seed beds during January and February. About 20 days later the rice shoots are transplanted from seed beds to rice fields. Generally, about two weedings are necessary to keep the rice clean. About 90 days after planting, the rice is ready for harvesting. Rice is cut and piled into shocks; hauled

to clean, dry ground; and spread out to dry in the sun. Once dry, the rice is threshed and winnowed until only the clean seed remains. The rice seed is then sacked for sale or storage.

In Maranhão, rice is planted in December-January and harvested about 120 days later. Also, rice is planted directly in the field rather than transplanted from seed beds. At harvest time, the rice is cut, shocked and stored in the field for long periods of time unthreshed.

In both areas, all operations are done manually, with the exception of plowing in the São Francisco area, where tractors are sometimes used. Mechanization has not come to rice production in the Northeast.

The most common rice variety grown in both areas is of the Japanese type, called "*com cru*" in the Maranhão area. The kernels of this type are smaller (short and plump) and are generally regarded by Recife consumers as of lower quality than other types. However, farmers in both areas, especially in the São Francisco area, also plant "*cana roxa*" variety, which has long, slender kernels. It is a medium quality rice. Moreover, in handling the seed of various varieties and types, they are frequently mixed and degenerated to a degree that results in low yields and low quality rice. Consequently, the more uniform, higher quality, more productive varieties from Southern Brazil command higher retail prices in Recife.

Beans - Bean varieties planted by Irecê farmers are about the same as those planted by the Al-Pe producers. However, Al-Pe producers tend to use several different varieties, while most Irecê producers most commonly use only the popular "*bage roxa*" variety. The greater number of varieties in use indicates less consensus about what is best for the Al-Pe area. In both areas there is a need for new and improved varieties which are highly responsive to the use of modern farm technologies. Even present varieties could probably be more productive with improved seed selection on farms. In addition, new strains of the present varieties might be more productive than what is presently available.

The interplanting of complementary crops like beans and corn is advantageous if done in a proper way, but can be a very real barrier to mechanization of bean production in the Al-Pe area. When crops are interplanted, it is quite common to find them completely unorganized. Consequently, mechanization is nearly impossible and even hand labor is more difficult than when each crop is planted separately in rows.

Manioc - The types of manioc planted by producers showed little variation among the groups surveyed. The variety *Izabel de Souza* is used by 90% of producers. However, most manioc producers planted more than one type.

Manioc is a tuberous crop grown mainly as a starchy food product. The plant is cultivated primarily for its roots, which are processed into a variety of product forms. The size of the roots shows tremendous variation, ranging from 20 cm. to approximately 1 m. in length. Roots which are two years old generally average 4 to 5 kgs., but may go as high as 8 to 10 kgs. Manioc is propagated vegetatively with cuttings from the stems of six-month-old plants. These cuttings are generally planted at the beginning of the rainy season (March and April) and can be harvested 18 to 20 months later. The manioc grows rapidly until the dry season begins, then remains dormant until the beginning of the next rainy season.

The roots are usually harvested during the second year after planting, although there can be wide variations in time of harvest. The root contains most of the food value in the plant, although considerable potential for livestock feed exists in the now unused stems and leaves.

Cotton - The cotton tree belongs to the "*malvaceas*" family native to Brazil, which is well adapted to the climatic conditions in the Northeast's Drought Polygon. This type of cotton plant, the major type produced in the survey area, is perennial and is usually replanted every four to eight years. Productivity is greatest in the first four years, with a drastic decline after the fifth year. Nevertheless, most cotton producers have not yet recognized this fact and continue to leave the trees beyond the sixth year.

Interplanting of other crops with cotton is a common practice--96% of the cotton farmers in the survey area plant cotton together with some other crop. About 66% plant both corn and beans in their cotton fields. The practice of planting other crops together with cotton is in part responsible for lower yields per hectare for cotton. The farmers use interplanting practices for various reasons--insurance against over-all loss of farm income from limited planted lands as a result of poor cotton yields or low prices, better utilization of cultivated lands by taking advantage of labor in cultivation for more than one crop in the same area, and increasing total income per hectare cultivated.

Man and hoe are by far the most common means of cultivation in cotton production. The family supplies the labor for smaller farmers and larger farmers use a sharecropping arrangement.

Milk - Dairy farms in the survey were most frequently of the owner-operator type and were not unusually large. The median farm size was about 100 hectares. No sharecropping arrangement exists, but about 60% of the farmers reported having hired workers.

Most milk producers specialize in livestock production--for milk and meat or for breeding stock. The most frequently planted crop other than grasses and cactus palm was corn, which is almost always consumed largely on the farm or sold for local human consumption. None is used in cattle rations.

The average number of cattle, including oxen, steers, heifers and milk cows, was 59 per farm. But the average number of cows in lactation during 1966 was only 16 head. This low ratio of milk cows to total herd is due to short lactation periods, averaging only six months, and to the large number of draft, meat, and breeding animals produced. The dominant milking breed on farms in the sample was Holstein, although only 13% of the farms had purebred Holsteins. Another 26% had herds described as "primarily Holstein" and 48% had "mixed or half-blood" animals.

During the wet season the basic feed for dairy cattle is natural grass and planted pasture. As noted earlier, the average number of hectares of planted pasture on dairy farms increased from 2.5 to 6.5 between 1965 and 1967. Moreover, 28% of the farmers planted pasture for the first time during that period. This suggests a growing recognition of the benefits to be derived from improved pastures. During the dry season, cactus palm, which is produced by all farmers in the sample, is the basic feed. It is supplemented by cottonseed meal or cake. In 1966 an average of 3.6 kilos of cottonseed meal was fed per lactating cow.

Hand milking is usually done only once a day, with the calf being permitted to run freely with the cow throughout the day. At milking time the calf is tied to the neck of the cow to keep him near the cow in order to stimulate lactation and to keep him out of the milker's way. The calves are usually kept with the cow for four to eight months.

Use of Modern Farm Inputs

It has been argued that the use of improved farming methods and new technologies is a necessary requisite to sustained economic

growth in most rural areas. The foregoing description of cultural practices has given the reader an indication of the primitive level of production methods for the five commodities under study. Table 8.11 shows the percentage of farmers in each survey area who were using selected inputs. The most widely used production innovations among all groups are improved seeds and insecticides. The high response on improved seeds, however, is probably due to the wording of the question, which led most farmers to reply affirmatively even if they were doing nothing more than selecting the biggest and best looking seeds from their own production for planting. Had the question specified use of special improved varieties, strains, or hybrids, the response would have been much lower, since the supply of such improved seeds that have been developed for the Northeast is very limited.

It is noteworthy that chemical fertilizers are not used by most farmers in the areas surveyed. Only rice farmers in the São Francisco area indicated some use of chemical fertilizers (11.8% of the farmers interviewed).

The three columns showing the percentage of farmers owning ox and plows, hand planters and tractors indicate the principal source of power for cultivation in the areas studied. Codó rice farmers appear to use human labor exclusively, while the majority of São Francisco area rice growers use tractors (51.2%) or ox and plow (23.6%). Irecê bean farmers show more widespread use of tractors than any other group (65.3%), while Al-Pe area bean producers use ox and plow almost exclusively (94.5%). Manioc and cotton farmers most frequently use human labor, although both use ox and plow to some extent (manioc, 8.7%; cotton, 34.5%).

Indications are that, in spite of the fact that milk producers are the best capitalized and most prosperous of the five farmer groups, their production methods remain quite traditional (Table 8.11). Only about 39% milk their cows more than once a day. This low percentage is no doubt related to the fact that only 1.6% have refrigerated storage to hold the milk until it can be picked up by a buyer. While vaccination against diseases is quite common, only 18.3% used the practice of washing the cow's udder before milking.

Earlier, an innovation index was described which reflects the number of the above innovations adopted by a particular farmer. The reader will recall that chi-square tests of significance showed a relationship at the .05 level between that index and total farm sales. In addition, for both rice and bean farmers, innovativeness

Table 8.11 Percentage of Farmers Using Selected Innovations, by Commodity, 1967

	Non-chemical fertilizer	Chemical fertilizer	Improved seed	Insecticides	Fumigants	Ox and plow	Hand planter	Tractor	Pesticide dusting machine
Rice:									
Codó	0.0	0.0	18.5	40.7	11.1	0.0	0.0	0.0	0.0
São Francisco	24.4	11.8	58.3	70.1	26.8	23.6	10.2	51.2	18.9
Beans:									
Irecê	0.0	0.0	65.3	44.9	89.8	14.3	49.0	65.3	24.5
Al-Pe	9.4	0.0	56.3	14.1	73.4	94.5	80.5	1.6	7.8
Manioc	35.3	0.7	50.0	18.7	0.0	8.7	0.0	2.0	20.0
Cotton	7.9	0.6	52.1	64.8	0.6	34.5	0.6	4.2	31.5

	Animals permanent stable	Take milk in corral	Milk twice per day	Cooling tank	Artificial insemination	Vaccination	Wash udder before milking	Planted pastures	Forage cutter	Silo	Feed concentrate year round
Milk	23.0	63.5	38.9	1.6	1.6	91.3	18.3	82.5	20.6	14.4	40.5

SOURCE: SUDENE/MSU Farmer Survey (1967).

was found to be significantly related to a combined literacy-education index, indicating that the more innovative rice and bean farmers are the better educated and those who also have greater exposure to newspapers, magazines, radio and television. The absence of such significant relationships for manioc and cotton farmers reinforces earlier observations that those farmers are uniformly traditional in their attitudes and actions and that only random relationships exist between modern input use and such things as education and mass media exposure.

Input Availability

Farmers must have inputs available for purchase or rental in nearby towns before they can begin to use them on a wide scale. Table 8.12 gives the percentage of farmers in each commodity group who indicated that chemical fertilizers, insecticides and rental tractors were available in their own *municipios*. Chemical fertilizers are generally not available in the areas where these samples were taken, but most farmers believed that insecticides could be purchased in their *municipios*. The percentage who believed that rental tractors were available in their *municipios* was surprisingly high.

Table 8.12 Percentage of Farmers Who Believed They Could Purchase Selected Farm Inputs in the *Municipios* Where They Live, by Commodity, 1967

Commodity	Chemical fertilizer	Insecticides	Rented tractor available
Rice:			
Codó	3.7	77.8	7.4
São Francisco	8.0	50.4	43.3
Beans:			
Irecê	8.2	93.9	98.0
Al-Pe	11.7	69.5	28.9
Manioc	4.7	42.7	14.7
Cotton	2.4	87.9	15.8

SOURCE: SUDENE/MSU Farmer Survey (1967).

It was hypothesized that the use of modern farm inputs would be greater for those farmers who lived in *municipios* where such

inputs could be purchased or rented. If one compares the percentage of adoption for chemical fertilizers, insecticides and tractors in Table 8.11 with the percentage of farmers who felt those inputs were available in their *municipios*, it is clear that the two are related; i.e., farmers who can purchase farm inputs near their farms seem more likely to be using them. This should not, however, be interpreted to mean that just because a particular farm input is available in a given area, it will be rapidly adopted. The process is much more complex, involving relative prices between the input and farm products, the level of information and knowledge about the input available to farmers, the degree of complementarity between this and other farm inputs, the availability of credit to finance the input purchase, and the stability of the farmer's primary product market. All these and many more factors will influence the degree to which modern farm practices are adopted.

Attitude Toward Chemical Fertilizer

Since chemical fertilizers have been shown to be an important way of dramatically improving product yields in other parts of the world, farmers in the survey were asked a series of questions on fertilizer use. It was found that in most areas a large percentage of farmers were not even familiar with chemical fertilizers (Table 8.13). Only 18.5% of the Codó rice farmers and 29.1% of the cotton farmers knew about chemical fertilizers. The majority of farmers in other areas knew about the input, with 88.2% of the São Francisco area rice farmers and a surprising 68.7% of manioc farmers responding positively.

Those farmers who knew about chemical fertilizers were asked to agree or disagree with a series of statements. Three general conclusions can be drawn from those results. First, it appears that some farmers believe that using chemical fertilizers is difficult and requires more know-how and skill than they currently possess. Second, the evidence suggests that a good many farmers who know about fertilizers do not believe that their use would be profitable at current prices and on their land. Finally, the availability of credit and the feeling that neighbors would think they are foolish, appear to limit the use of fertilizer for most commodities.

While tabulations are not available to determine the degree of overlap in farmer agreement with the three categories mentioned above, it is clear that a good bit exists. That is, many farmers agreed that fertilizers were difficult to use, were not profitable

Table 8.13 Percentage of Farmers Agreeing with Selected Statements about Chemical Fertilizers, by Commodity, 1967

Commodity	Know what fertilizers are[a]	Difficult to use fertilizers	Land does not need fertilizer	Doesn't pay to use fertilizer	Would use fertilizer if cheaper	Neighbors think using fertilizer is foolish	Would buy fertilizer if could borrow more money
Rice:							
Codó	18.5	11.1	14.8	18.5	18.5	11.1	14.8
São Francisco	88.2	23.6	19.7	8.7	81.1	18.9	72.4
Beans:							
Irecê	50.0	18.4	38.8	34.7	8.3	38.8	2.1
Al-Pe	53.9	24.2	21.9	10.9	35.9	28.1	30.5
Manioc	68.7	24.7	10.7	3.3	59.3	18.0	57.3
Cotton	29.1	12.7	12.7	3.6	23.0	6.7	19.4
All	56.0	20.3	17.5	8.2	44.2	18.6	39.8

[a]If the farmer did not know what fertilizer was, then he was not asked the remaining questions. Therefore, the percentages in the last six columns cannot exceed the percentage in the first column.

SOURCE: SUDENE/MSU Farmer Survey (1967).

on their land at current prices, and yet at the same time said they would use fertilizer if more credit were available. This inconsistency can probably be traced to two things: pure respondent bias (i.e., a tendency to agree with everything) and a lack of understanding about the economic relationships implied in these statements. It must be remembered that these are poorly educated farmers whose understanding of the interrelationships of factors affecting profit are necessarily limited. It is significant, however, that most seem concerned about fertilizer prices and the availability of credit.

Distribution of Purchased Farm Inputs

An important question for the agricultural sector is the extent to which industry has lagged in the development and distribution of modern agricultural inputs. The following section considers some of the problems associated with the rural distribution of these inputs. The purchased inputs selected for emphasis in this phase of the study were those which are believed to have the greatest potential for increasing farm productivity. This included fertilizers, insecticides, improved seeds and farm machinery. The main interest of this survey was to determine the actual availability of these inputs to producers in the area where they live. Because of the lack of transportation in these areas, most producers are unable to go to the large urban trading centers to buy these items. Therefore, these inputs must be made available in local trading centers where the farmers go to do their buying and selling.

The rural areas in which input distributers were surveyed were the same areas in which farm interviewing was done for the five basic commodities studied. A list of input distributors in these areas was compiled in two ways. First, a list of firms selling these inputs was compiled from those registered with Dunn & Bradstreet as of 1966. Secondly, a list of firms in each area was compiled in the field to supplement the Dunn & Bradstreet list. Input distributors were then systematically selected for interviewing by giving preference to those who sold the inputs mentioned earlier. A total of 30 interviews was completed.

Types of Input Distributors

In most cases, one of the owners or a manager was interviewed. In 63% of the firms there was more than one owner. Most of the

firms were family-owned stores. Sixty-three percent of the firms were hardware stores and 26% were government-owned stores. The remaining firms were cooperatives (7%) and others (4%).

Inputs Sold

The availability of modern farm inputs was determined by a series of questions on items being sold (Table 8.14).

Table 8.14 Percentage of Distribution Firms Selling Selected Farm Input Items in Areas Studied, 1967

Input Item	% Selling
Chemical fertilizers	0
Crop harvesting machines	4
Tractor sale	7
Tractor rental	15
Selected seed	18
Scale	18
Plow	30
Machine parts	33
Barbwire	41
Fungicides	44
Machine sprayer	48
Hand planter	52
Insecticides	78

SOURCE: SUDENE/MSU Input Survey (1967).

Not one of the firms interviewed sold chemical fertilizers. Seventy-eight percent sold insecticides and 44% sold fungicides. Only 18% of the firms sold improved varieties of seeds. Tractors were rented by 15% of the firms and sold by 7%. A more detailed analysis of tractor rental and sales reveals that availability is concentrated in the São Francisco rice and Irecê bean areas and that tractors are not available in the remaining areas. The reader will recall that these were the two areas in which about 50% of the farmers used tractors. Hence, availability of all but a few modern farm inputs is very limited in these areas.

In addition to lack of availability of farm inputs, another major barrier is lack of machine parts and repair facilities. Only 33% of the firms interviewed handled the spare parts for the machines they sell. Small hand tools such as axes, scythes, etc., are easily available in these stores and were also found to be available in the *feiras*.

Supply Sources

The major supply sources of the firms which handled insecticides and fungicides were Recife (42%) and São Paulo (21%). The remainder came from other towns. Most of the firms (52%) purchased directly from the factory. Other common suppliers were wholesalers in Recife or salesmen from other cities. Most of the interviewed firms agreed that they didn't have any real buying problem, although a few said that insecticides were sometimes not available from the suppliers when they wanted them.

Only 10% of the interviewed firms have used any kind of mass media advertising, yet they agree that lack of farmers' knowledge is their major selling problem. Another serious problem is lack of farmers' buying power.

The distribution channel for firms handling plows and tractors was slightly different. The two firms which sold tractors said they purchased the tractors in São Paulo directly from the factory. Both firms agreed that there were no real buying problems for them.

One of the firms had used the radio as a means of advertising. Both firms agreed that their major selling problem was lack of farmer purchasing power.

The firms selling plows bought from São Paulo (57%), Rio de Janeiro (92%) and others (14%). The other category includes an interior town in the Northeast, Garanhuns, in which plows are manufactured. In all cases, the firms purchased directly from the factory. Their major buying problem was lack of local salesmen with whom they could make regular contact. Fourteen percent of these firms had used the newspaper or radio as means of advertising their products. Two selling problems were the most important for these firms. The first is that the producers do not know about what they are selling and the second is that producers lack the purchasing power needed to buy.

Transaction Size

Transaction sizes are very small for both insecticides and fungicides. In the case of insecticides, the average size of sales was about 7 liters or 11 kilos of material. Fungicides are bought on a much smaller scale. The average size of sale was 1 liter or 3 kilos of fungicides. Tractors and plows were both bought and sold in individual units because of their value per unit.

Marketing Margins

Retail gross margins for insecticides were 45% and for fungicides 40%. On tractors and plows, the firms showed a gross margin of 25% and 26%, respectively.

Tractors are the most expensive input items on the list of items priced (Table 8.15).

Table 8.15 Selling Price of Selected Farm Inputs by Firms in Areas Studied, 1967

Input Item	Price in NCr$
Valmet tractor	13,400.00
Massey Ferguson 50-X	14,070.00
Paraguassu Plow[a]	85.00
Sans Plow[a]	90.00
Gezerol 33 (insecticide)	1.18/kilo
Shell insecticide	1.51/kilo
Cottonseed	0.20/kilo
Bean seed	0.50/kilo
Corn seed	0.40/kilo
Cottonseed meal	0.14/kilo

[a]The plows are a one-moldboard walking plow pulled by a team of oxen.

SOURCE: SUDENE/MSU Input Survey (1967).

Increased competition and higher volumes on insecticide sales could probably reduce the gross margins and therefore prices to farmers. Selected seed prices appear to be about 40% higher than commodity prices, but there is no way of knowing how good such

selected seeds really are. It was noted earlier that few highly improved varieties have been developed for widespread distribution.

Fertilizer prices are high in relation to farm product prices. Table 8.16 shows the kilos of rice needed to buy 1 kilo of fertilizer. Compared to most other countries, the ratio for Northeast Brazil is unfavorable. Since the selling price in Recife was used, the cost of transportation to rural areas would make the farm price higher or a minimum of 3 kilos of rice to buy 1 kilo of this fertilizer. Thus, it is evident that terms of trade make it difficult for farmers to adopt fertilizer in Northeast Brazil. Lower priced fertilizer, brought about through expanded local production and reduced distribution cost, would likely stimulate fertilizer use by farmers.

Table 8.16 Kilos of Rice Required to Purchase 1 Kilo of Fertilizer (Super Phosphate More Than 25% P_2O_5)

Country	Kilos of Rice
Pakistan	0.89
Japan	1.00
U.S.A.	1.02
India	3.19
Northeast Brazil[a]	2.11

[a]SUDENE/MSU Input Survey (1967).

SOURCE: Mosher, A.T., *Getting Agriculture Moving* (New York: Frederic A. Praeger, 1966), p. 105.

In summary, information from the input distribution survey shows a strong correlation with the previous data on farm use and perceived availability of selected purchased inputs. Fertilizers are not available for sale in the areas covered by this study. The earlier discussion of farmers' reasons for not using fertilizers suggests that the input is not distributed in these areas partly because farmers do not know about them or feel they would be unprofitable at current price ratios. This seems to be a basic factor for lack of all the modern inputs considered.

It seems likely that improved seeds are not distributed in rural areas through local retailers primarily because of unavailability of supply and lack of concentrated work, until very recently,

on development of varieties that are significantly better than native stocks. It should be pointed out that SUDENE, in cooperation with various state and national agencies, has recently supported a program of expanded production of corn, beans and cotton seed for distribution direct to cooperating farmers (not through regular retail channels). Those 18% of the firms which do sell improved seeds typically handle seeds selected from native varieties rather than well-developed and highly productive new strains or varieties.

Tractors and equipment were available primarily in the Irecê area and in the São Francisco rice producing region and at high prices relative to gross farm incomes for the Northeast.

Insecticides and fungicides are the only group of farm inputs which are readily available in rural areas, other than traditional hand tools and hardware items. All classes of input distributors mentioned lack of farmer knowledge and purchasing power as the most important factors limiting sales.

Food and Non-Food Distribution and Consumption

Importance of Rural *Feiras*

The most important market outlet in the rural areas of Northeast Brazil is the *feira*. The *feiras* are composed of large numbers of small operators who sell their wares from small portable stalls. The *feiras* are operated on a weekly basis and generally last for one to two days. At this weekly *feira*, farmers will sell much of their production and buy most of their food and non-food items. The importance of the *feira* as a distributor of consumption goods in rural areas should not be underestimated. The wide variety of goods sold in rural *feiras* includes cereals, tuberous products, vegetables, fruits, meat, fish, hardware, clothes, home furnishings, kitchen utensils, canned foods, jewelry, medicines and sundry items.

Frequency and Method of Travel to Local *Feiras*

Table 8.17 presents the location of *feiras* used by producers of selected commodities.

Most producers regularly attended the *feiras* in the *municipios* where they lived and showed little geographic mobility in their buying habits (Table 8.18). Less than 20% buy outside of the *municipios* in which they live. In addition, a high percentage of farmers frequent those *feiras* about once a week.

Table 8.17 Geographic Distribution of *Feira* Attendance by Producers of Commodities Studied, 1967 (%)

Locale	Producer Group					
	Rice	Beans	Manioc	Cotton	All producers[a]	Milk
Seat of *municipio*	79.9	58.4	67.3	80.6	71.8	87.3
Village of *municipio*	9.1	26.4	2.0	4.8	10.8	4.8
In city--other *municipio*	9.7	14.0	28.7	9.1	15.2	4.8
Village of other *municipio*	1.3	0.6	2.0	-	0.9	-
Other state	-	0.6	-	2.4	0.8	-
Didn't know	-	-	-	3.1	0.5	3.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

[a]Milk excluded.

SOURCE: SUDENE/MSU Farm Survey (1967).

Table 8.18 Frequency of Attendance and Distances Traveled to Rural *Feiras* by Producers of Selected Commodities, 1967 (%)

Visits to *feira* per month	Producer Group				
	Rice	Beans	Manioc	Cotton	Milk
1 - 3	4.5	11.2	8.0	13.9	4.0
4	31.2	57.9	77.3	63.0	57.1
5 - 8	5.1	3.4	0.0	0.0	2.4
No Response	59.2	27.5	14.7	23.1	36.5
Total	100.0	100.0	100.0	100.0	100.0
Distance	**Rice**	**Beans**	**Manioc**	**Cotton**	**Milk**
0 - 10	20.1	27.0	66.0	30.9	20.6
11 - 20	10.4	38.2	15.3	28.5	28.6
21 - 30	5.9	6.7	2.0	13.3	11.9
31 - 40	1.9	0.6	0.7	4.3	--
40 plus	1.3	0.5	2.1	1.8	0.8
No Response	60.4	27.0	13.9	21.2	28.1
Total	100.0	100.0	100.0	100.0	100.0

SOURCE: SUDENE/MSU Farm Survey (1967).

Manioc farmers travel the least distance to the *feira*, while cotton and milk producers travel the farthest (Table 8.18). In general, about 59% of producers travel less than 20 km. to go to the *feira* and only 10% go more than 20 km. to the *feira*.

Thus, farmers concentrate most of their product marketing and consumer goods purchases in *feiras* near their farms and most frequently attend those *feiras* once a week. The no-response categories in Table 8.18 are made up mostly of those farmers who live in the towns where they attend the *feira*. This caused the high no-response percentages for rice and milk.

Table 8.19 presents data indicating the mode of transportation used by farmers to get to the *feira* and the kinds of roads passing by farms in the sample. Rice farmers generally go by

Table 8.19 Methods of Transport to Rural *Feiras* and Types of Roads Passing Farms, by Commodity, 1967 (%)

Types of Transport	Producer Group				
	Rice	Beans	Manioc	Cotton	Milk
Walk	7.8	10.7	44.0	8.5	5.6
Back of animal	11.0	37.6	28.0	49.7	15.9
Ox cart	--	1.1	--	--	0.8
Motorized vehicle	8.4	23.6	13.4	18.8	40.4
River	11.7	--	--	--	0.8
No response	61.1[a]	27.0	14.6	23.0	36.5
Total	100.0	100.0	100.0	100.0	100.0
Type of Road	**Rice**	**Beans**	**Manioc**	**Cotton**	**Milk**
Paved, gravel, or graded dirt	29.7[a]	13.7	12.4	15.7	22.1
Ungraded dirt	14.2	19.8	9.7	17.0	19.8
Ox cart road	42.5	63.2	66.9	59.4	51.6
River	9.0	--	--	--	4.0
Other	--	--	9.7	4.8	--
No response	4.6	3.3	1.3	3.1	2.4
Total	100.0	100.0	100.0	100.0	100.0

[a]The high percentage found here is because of farmers living in town.

SOURCE: SUDENE/MSU Farm Survey (1967).

river, although riding animals is a close second. Bean farmers most frequently ride animals, as do cotton farmers. Manioc farmers, on the other hand, travel to the *feira* most often on foot. Finally, milk producers show the greatest use of motorized vehicle of any of the farmer groups. The data on types of roads suggests that, as one might expect, the dairy farmers more frequently live on roads passable by motorized vehicle and less frequently on ox cart roads; next come rice, bean, cotton and manioc farmers.

In summary, accessibility to the market place is limited by the types of transportation used by producers and by the roads on which they must travel. Furthermore, selling crops or buying inputs in large-scale, cost-reducing transactions will not be feasible for many farmers until an improved system of transportation is available.

It has been shown that the market visited by a majority of producers is the market within their own *municipios*. Very few are able to go to large urban markets to do their purchasing. The local markets are visited by the producers on a regular weekly basis, which proves that they have frequent contact in the local towns. Therefore, to increase sales of industrialized goods in these areas it is necessary to make the goods available in the local *feira*. Since very few producers are in regular contact with an urban market, there is little opportunity for them to develop a desire for industrially produced consumer and/or production goods. Once this exposure exists, it may stimulate them to produce more in order to be able to buy the things they want.

Food Consumption

To determine with accuracy the extent of farm participation in the market economy, questions pertaining to food purchases were asked. Table 8.20 shows the average monthly food expenditure by producers and the number of people they are feeding with this budget. Manioc producers spend the least total amount of money and the least amount per capita on foods. At the other extreme, milk producers spend the largest total amount per capita. They spend almost twice as much per capita on food as do the manioc producers. Bean, manioc and cotton growers each spend over 65% of their gross farm income for food, while rice and dairy farmers spend 29% and 19%, respectively. Even though all farmers are able to produce much of their own food, it is clear that bean, manioc and cotton farmers do not have sufficient income to cover all non-food necessities and still maintain a nutritionally adequate diet.

Table 8.20 Monthly Food Expenditures, Percent Gross Farm Income Spent on Food and Number of People Fed by Producers of Selected Commodities, 1967

Question Item	Producer Group				
	Rice	Beans	Manioc	Cotton	Milk
Monthly food expenditure (NCr$)	134.44	114.63	84.99	92.60	182.69
Percent income spent on food	29.2	65.0	67.8	75.5	18.9
Number of people fed regularly	6.8	7.5	6.9	7.4	7.7
Monthly food expenditure per capita (NCr$)	19.77	15.28	12.32	12.51	23.72

SOURCE: SUDENE/MSU Farm Survey (1967).

In order to determine what kinds of food items were purchased by farmers, they were asked to indicate which of a list of products they regularly purchased. Rice, beans, manioc and milk purchases showed up with the lowest percentages among all products for all farmer groups (Table 8.21). This suggests that these products are

Table 8.21 Percentage of Producers Buying Selected Food Items (percent)

Food Items	Producer Group				
	Rice	Beans	Manioc	Cotton	Milk
Rice	25.3	56.2	47.3	30.3	38.1
Beans	57.8	6.7	48.0	10.3	20.6
Manioc	48.1	59.0	12.7	73.9	31.0
Powdered milk	21.4	7.3	14.7	9.1	2.4
Fluid milk	81.8	71.8	20.0	11.5	--
Dried beef	57.1	49.4	80.7	21.8	29.4
Dried cod	56.5	48.9	82.0	20.6	29.4
Bread	73.4	76.4	72.0	55.2	39.7
Beverages	24.0	10.7	20.7	6.1	6.3
Fresh meat	75.3	79.2	69.3	67.3	44.4
Spaghetti	51.3	33.1	31.3	39.4	23.0

SOURCE: SUDENE/MSU Farm Survey (1967).

more frequently produced for home consumption. Most frequently consumed by all farmer groups were various types of dried and fresh meats. Bread and spaghetti are consumed by a fairly large percentage of all farmer groups. The response on beverage consumption is interesting. The group which appears least able to afford them (manioc producers) shows one of the highest percentages of beverage consumption, while dairy farmers show one of the lowest.

In general, the ownership of consumer durable goods is quite low (Table 8.22). The most widely owned items among all producers were the sewing machine and the radio. Jeeps or other vehicles are the least commonly owned items. The milk and rice producers

Table 8.22 Percentage of Producers Owning Selected Non-Food Consumption Items, 1967

Non-Food Item	Producer Group					
	Rice	Beans	Manioc	Cotton	Milk	All producers[a]
Jeep or other vehicle	9.7	7.3	4.7	9.1	38.9	7.8
Crop sprayer	22.7	12.4	6.7	27.9	19.8	17.5
Scale	42.2	36.0	39.3	49.7	42.1	41.5
Sewing machine	74.0	74.2	56.0	67.9	85.7	68.4
Refrigerator	22.1	7.9	6.7	7.3	33.3	11.0
Good quality kerosene lantern	37.7	14.6	6.0	6.1	12.7	15.9
Functioning radio	72.0	54.5	56.7	52.7	88.1	58.7
Electricity	1.3	1.1	1.3	6.7	8.7	2.6

[a]All producers except milk producers.

SOURCE: SUDENE/MSU Farm Survey (1967).

show the highest general rate of ownership for all items. Milk producers own significantly more refrigerators than any other group, while rice producers are second. Milk producers also own vehicles more frequently than any other group. Radios are owned by a majority of each producer group, but only rice and milk

producers show a very high rate of ownership. Only 2.6% of the farms have electric power.

Farmers have to decide how to divide their cash income between consumption goods and the purchase of production inputs. When these decisions are made, the future productivity of the farm is affected. Producers were asked how they would spend their additional money if this year's harvest produced NCr$500.00 more than they expected. The alternative consumption and investment items among which they were asked to choose were better food for the family, medicine, clothes, home improvement, fertilizers, cattle, land, and good quality seeds. The list contains four items which are consumption goods and four which are investment goods. An index was constructed to evaluate the relative preferences between these consumption and investment goods. A high index value would indicate a greater preference for investment goods, and vice versa.

Table 8.23 shows the percentage of producers who would buy the selected items. The most obvious conclusion to be drawn from the table is that all producers have very high propensities to spend additional income.

Table 8.23 Percentage of Producers Willing to Buy Selected Goods as a Result of Higher Incomes by Producers of Selected Commodities, 1967 (percent)

Item	Producer Group					
	Rice	Beans	Manioc	Cotton	Milk	All producers[a]
Better food for family	85.1	86.5	91.3	92.1	75.4	88.7
Medicine	88.3	89.3	94.7	92.7	74.6	91.0
Clothes	88.3	92.1	94.0	94.5	79.4	92.2
Home improvements	85.7	91.0	90.0	88.5	73.0	88.9
Fertilizers	76.0	39.9	80.7	44.8	50.0	59.3
Cattle	69.5	80.3	77.3	81.8	85.7	77.4
Land	63.0	70.2	77.3	69.1	73.0	69.8
Better seed or breed	72.7	75.8	80.7	94.5	75.4	80.9

[a]All producers except milk.

SOURCE: SUDENE/MSU Farm Survey (1967).

However, among the various groups of producers there are differences in preferences. The two groups (manioc and cotton) that spend the least money on food and buy the narrowest selection of food items would most frequently spend some of the additional money on food. Milk producers, who spend the most money on food, would least frequently spend additional money on food. Two groups (rice and manioc producers) indicated a very high preference for fertilizers, which is rather surprising, particularly for the manioc producers. Cotton producers show a strong preference for the use of improved seed varieties. This is probably due to SUDENE's cottonseed distribution program. Dairy producers prefer to buy livestock more frequently than any other group.

In general, producers prefer to buy more consumer goods than investment goods. One could expect that a greater portion of additional income earned will be spent on goods to improve well-being before spending on farm investments. Producers are presently living below their desired standard of living and hence prefer to spend additional money on consumer goods.

Summary

Agricultural production in the commodity areas studied seems to be highly traditional. Most labor is done by hand with the hoe--even the ox and plow are not commonly used among manioc and cotton farmers. Similarly, farmers use relatively few modern farm inputs. As a result, crop yields are low.

Farmers evidenced a willingness to respond to price changes. Most farmers would attempt to plant more acreage or otherwise increase output if prices went up. It is also clear that many farmers would respond to a guaranteed price by expanding output. The likelihood that farmers would reduce output with falling prices seems to be much less than the likelihood of increased output as a response to higher prices. Thus, higher and more stable prices should stimulate production, while lower prices are likely to stimulate relatively less reduction in output.

The availability of land does not appear to be a serious deterrent to output expansion on many of the farms surveyed. On the other hand, labor availability might tend to limit the amount of new land which can be cultivated, since a high percentage of the farms are already using hired labor. However, it should be recognized that the present study basically reflects conditions

among landowners and does not tell much about labor availability among sharecroppers who may be underemployed.

The major barriers to output expansion among farmers in the survey areas are limited technical knowledge, the lack of availability of modern farm inputs, the high relative prices of those inputs, and the lack of farm credit (especially intermediate credit). Another barrier which will be discussed in the next chapter is the instability and uncertainty of product prices.

Most farmers interviewed showed a high propensity for purchasing consumption goods with additional income. The lower income farmer groups seem likely to spend any additional income on current family living expenses, such as food, clothing and household goods, as opposed to production goods. Since ownership of durable goods such as sewing machines and radios is relatively high among higher income farmer groups, it seems likely that the lower income farmers would (in the event of higher income) also allocate some proportion of the increase toward the purchase of such durables.

CHAPTER 9

THE RURAL MARKETING SYSTEMS FOR FIVE COMMODITIES

The Rural Marketing System for Beans

Introduction

Among Brazilian foodstuffs, beans are a primary commodity. "Beans are used at least once daily by almost 100% of the families and are the most important single source of protein in the diet."[1] Beans, rice and manioc serve as the staple foods in the Brazilian diet (Table 9.1). In 1960, the annual per capita consumption of beans was estimated at 19.6 kilos in urban areas and 34.8 kilos in rural areas. In addition, the income elasticity of demand for beans in the Northeast is positive at 0.18 (Table 9.1). Thus, growing populations and incomes mean that total demand will continue to expand.

Table 9.1 Per Capita Consumption and Income Elasticity of Demand for Basic Foods, 1960

Commodity	Per capita consumption in Brazil (kilograms)			Income elasticity of demand in Northeast
	Urban	Rural	Combined	
Beans	19.6	34.8	28.0	0.18
Rice	34.8	40.3	39.4	0.53
Manioc	40.0	199.6	124.6	-0.10
Corn	4.0	29.6	17.6	0.66
Potatoes	14.8	7.9	11.0	1.09

SOURCE: Getulio Vargas Foundation, *Projections of the Supply and Demand for Farm Products in Brazil*, Vol. 1, 1966, pp. 86ff.

[1] Northeast Brazil Nutrition Survey, A Report by the Inter-Departmental Committee on Nutrition for National Development, Washington, D.C., 1963, p. 97.

Nearly all the beans are used for human consumption. The most widely purchased type of bean in Recife is *mulatinho*, followed by *macassar*. *Macassar* is consumed by persons of lower incomes because its prices are usually lower than those of the *mulatinho*.

The estimates of supply and demand as presented in Table 9.2 indicate that production and consumption will remain in balance through 1975, but that output will need to increase by more than 24% to satisfy demand expansion.

Table 9.2 Estimates of Supply and Demand of Beans in Brazil

Year	1,000 tons actual demand	Internal supply
1965	2,520	2,520
1975	3,290	3,290

SOURCE: Getulio Vargas Foundation, *Projections of the Supply and Demand for Farm Products in Brazil*, Vol. 1, 1966, pp. 153-55.

In 1965, more than 70% of the beans were produced in the Center-South of Brazil, with the Northeast producing about 28% (Table 9.3). In the five year interval, 1960-1965, total Brazilian output increased 32% with no significant change in the relative proportions produced in the different regions. There are

Table 9.3 Bean Production in Each Region of Brazil, 1960-1965 (tons)

Region	1960		1965		Percent increase 1960-65
	Amount	Percent of Brazil	Amount	Percent of Brazil	
North	8,038	0.6	12,300	0.7	53.0
Northeast	494,931	28.5	645,538	28.1	30.4
Center-South	1,227,826	70.9	1,631,958	71.2	32.9
All Brazil	1,730,795	100.0	2,289,796	100.0	32.3

SOURCE: IBGE - Statistical Annuals of Brazil: 1963, p. 64; and 1966, pp. 104-105.

sizeable interregional movements of beans between the Center-South and the Northeast region. The size of this movement is unknown; however, 23% of the established Recife wholesalers did buy beans from the Center-South during 1967. There is no significant movement from the Northeast to the South. Thus, an expansion in regional production would first displace beans purchased from the South.

Three important bean producing states in the Northeast are Pernambuco, Bahia and Alagoas. The production, area planted, and yield per hectare for these states are compared with similar data for Minas Gerais and São Paulo in Table 9.4.

Table 9.4 Bean Production, Area Planted and Yield for Selected States, 1960/1965

States	Tons of Production		Hectares Planted		Yield per Hectare	
	1960	1965	1960	1965	1960	1965
Pernambuco	82,723	102,668	160,980	212,244	514	484
Alagoas	38,516	37,381	77,710	96,671	496	367
Bahia	93,149	144,751	121,291	165,781	768	692
Minas G.	350,909	305,584	520,306	516,633	675	591
S. Paulo	178,439	162,207	289,427	259,758	617	624

SOURCE: IBGE - Statistical Annuals of Brazil: 1963, p. 64; and 1966, pp. 104-105.

From 1960 to 1965, production increased 24% in Pernambuco, 23% in Bahia, 13% in Minas Gerais, and 9% in São Paulo. Production decreased slightly (3%) in Alagoas. Bean yields are relatively high in Bahia, averaging 693 kilos per hectare in the 1960-65 period. This compared with 588 kilos in São Paulo, 566 in Minas Gerais, 458 in Pernambuco, and 471 in Alagoas. There was no significant trend in bean yields over the five year period 1960-65 in the important bean producing states.

Description and Evaluation of the Rural Assembly System

Market Structure

The structure of the two assembly markets surveyed in this study presents certain contrasts and similarities. The rural market

for beans flowing to Recife from Irecê is somewhat less complicated and more direct than the Al-Pe market system. Itinerant buyers using truck transportation to pick up beans at the farm are an important force in the Irecê area. On the other hand, farmers in Al-Pe most frequently transport their beans by oxcart to a nearby village to be sold to a local assembler. Accompanying these differences, and no doubt partly responsible for them, are larger transaction sizes between farmers and assemblers in Irecê. Moreover, assemblers tend to handle a smaller annual volume in Al-Pe than in Irecê.

But in spite of these differences, many things are similar in the two areas. A variety of assembler types exist in both areas. Storage is relatively uncommon on farms, and metal cylinders are the most common storage facilities. These similarities and differences are discussed in some detail in this section.

Farmer Marketing Activities

The quantity of beans harvested by producers is shown in Table 9.5 for the areas of Irecê and Al-Pe. From 1965 to 1966, the increase in average quantity harvested was 13.6% in Irecê and 36.4% in the Al-Pe area.

Irecê producers sold about 80% of their production while the Al-Pe producers sold about 65-70% (Table 9.5). About 700-1100 kilos per farm were being retained for family consumption or seed, or were lost in storage.

Bean sales per producer for the combined areas amounted to NCr$1,195 during 1966. Irecê producers sold an average of NCr$1,772, while the producers in Al-Pe sold an average of NCr$964 (Table 9.5). The lower sales volume per farm in the Al-Pe area is a result of both lower prices received and less bean production available for sale.

For all bean producers combined, bean sales account for about 57% of total farm sales. The higher percentage for the Irecê area (63%) than for the Al-Pe area (52%) indicates the Irecê producers are more specialized in bean production.

Producers were asked for detailed information on up to four sales transactions. Information was obtained on time of sale, price, quantity, and to whom sold. In total, there were 312 sales transactions completed in Irecê and 240 in Al-Pe. Bean producers in the Al-Pe area made an average of 2.7 sales during 1966, while in Irecê the average was 1.6 sales.

Table 9.5 Bean Production and Sales Characteristics per Farm by Areas for 1965 and 1966

Characteristics	Irecê			Al-Pe			Combined Area		
	1965	1966	% Change	1965	1966	% Change	1965	1966	% Change
Quantity beans harvested (kilos)	3964	4503	13.6	2980	4066	36.4	3262	4187	28.3
Quantity beans sold (kilos)	3236	3619	11.8	1916	2907	51.7	2299	3105	35.0
Beans sold as percent of beans harvested	81.6	80.4	1.2	64.3	71.5	7.2	70.4	74.1	3.7
Bean sales 1966, NCr$	--	1772	--	--	964	--	--	1195	--
Total farm sales 1966, NCr$	--	2803	--	--	1835	--	--	2103	--
Bean sales as percent of total farm sales	--	63%	--	--	52%	--	--	57%	--

SOURCE: SUDENE/MSU Farmer Survey (1967).

Each producing area has a different harvest and marketing season. Irecê producers make 79% of their sales transactions in March through May. In Al-Pe, producers make 82% of their sales in September through January. Thus, there is a great deal of seasonal complementarity in the movement of beans from the two areas. In the aggregate, the months of September to December are the most important marketing periods because of dominance of the Al-Pe crop. The single most important marketing month for beans is the month of September. This is also one of the months with the lowest farm price of the year. June, July and August are months during which the local market is not being supplied by beans from these two areas.

Assembler Characteristics and Channel Maps

The number of firms in the different size categories, as well as the totals for the two areas being studied, is shown in Table 9.6. About 517 firms operate in the first area, while only

Table 9.6 Estimated Number of Assembly Firms by Categories for the Two Areas Under Study, 1967

Assembly Firm Type[a]	Al-Pe	Irecê
Large coordinated assemblers (handling more than 100 tons per year and selling exclusively to wholesalers)	15	2
Medium-sized assemblers (handling 50 to 240 tons per year and selling to truckers and assemblers as well as wholesalers)	174	18
Small assemblers (handling less than 120 tons per year and selling mostly to other assemblers)	306	25
Itinerant truckers[b]	122	25
TOTAL	517	70

[a]Ranges overlap considerably due to the variation in volume handled between areas and between urban and rural assemblers.

[b]This is an estimate of the number of itinerant trucker-assemblers who normally buy in the areas but who may not reside there.

SOURCE: SUDENE/MSU Assembler Survey (1967).

70 function in Irecê. It is quite apparent that there are relatively few large firms. There are large numbers of medium-sized firms and very large numbers of small assemblers in each area. The basic market structure is one of many firms characterized by large variations in size within and between categories. The Irecê area has a proportionately smaller number of small and medium-sized assemblers and a proportionately greater number of itinerant truckers than the Al-Pe area. The larger number of firms in the Alagoas-Pernambuco (Al-Pe) area is demonstrated by the fact that there is one assembler for every 48 tons of beans produced compared with one per 100 tons in Bahia.

The principal buying and selling patterns of the marketing system serving the two sample survey areas are summarized graphically in Figures 9.1 and 9.2. The circles on the maps indicate the transaction points in the channels, and the percent of product handled is indicated. The relative importance of each flow is represented by the width of the connecting lines. Also, the percent of product moving through each channel is indicated numerically in a small box within the connecting lines.

The SUDENE/MSU field surveys of producers, assemblers, wholesalers and retailers provided most of the data used in constructing the channel maps. These survey data were supplemented by follow-up interviews with selected market operators, direct observations by researchers and the use of secondary data. At best, the maps are reasonable approximations of market relationships for the specific areas studied and for the conditions that existed during 1966. The maps are probably not representative of the entire Northeast.

A comparison of the two channels reveals some basic differences between the two areas (Figures 9.1 and 9.2). The Al-Pe channel has more different types of buyers who handle smaller market shares and perform more specialized services. Irecê, on the other hand, has fewer types of buyers handling larger market shares. Small and medium-sized assemblers are more important in the Al-Pe channel than in the Irecê channel. Trucker-assemblers and wholesalers buy a much greater share of total production directly from Irecê producers than from Al-Pe producers. The Irecê channel appears to have eliminated the need for many small assemblers who still survive in the Al-Pe channel. Thus the latter channel necessitates more transactions to move from producer to retailer level.

An average of 3.4 transactions is involved in the movement of beans from producers in the Al-Pe area through the large urban whole-

FIGURE 9. 1
BEAN CHANNEL MAP
ALAGOAS & PERNAMBUCO

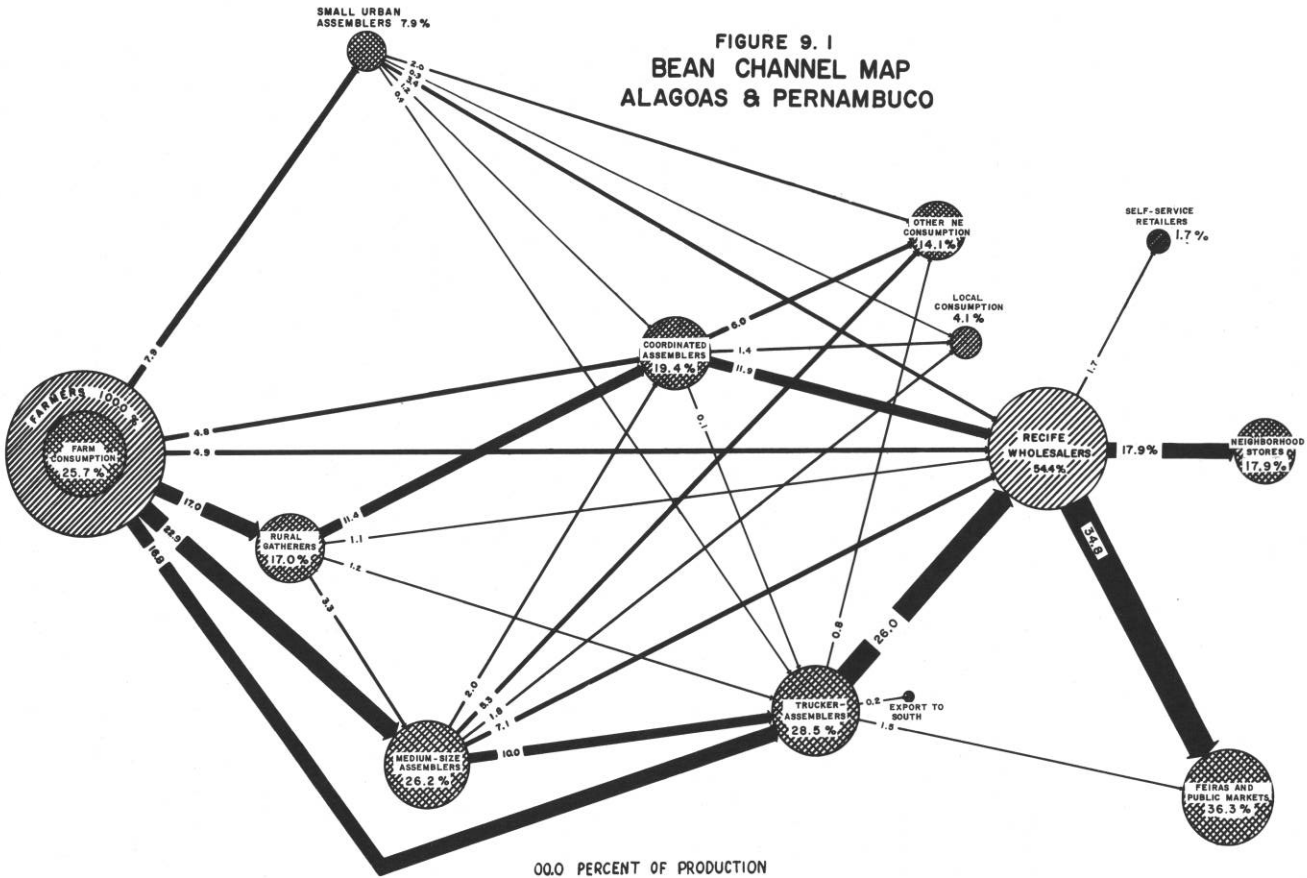
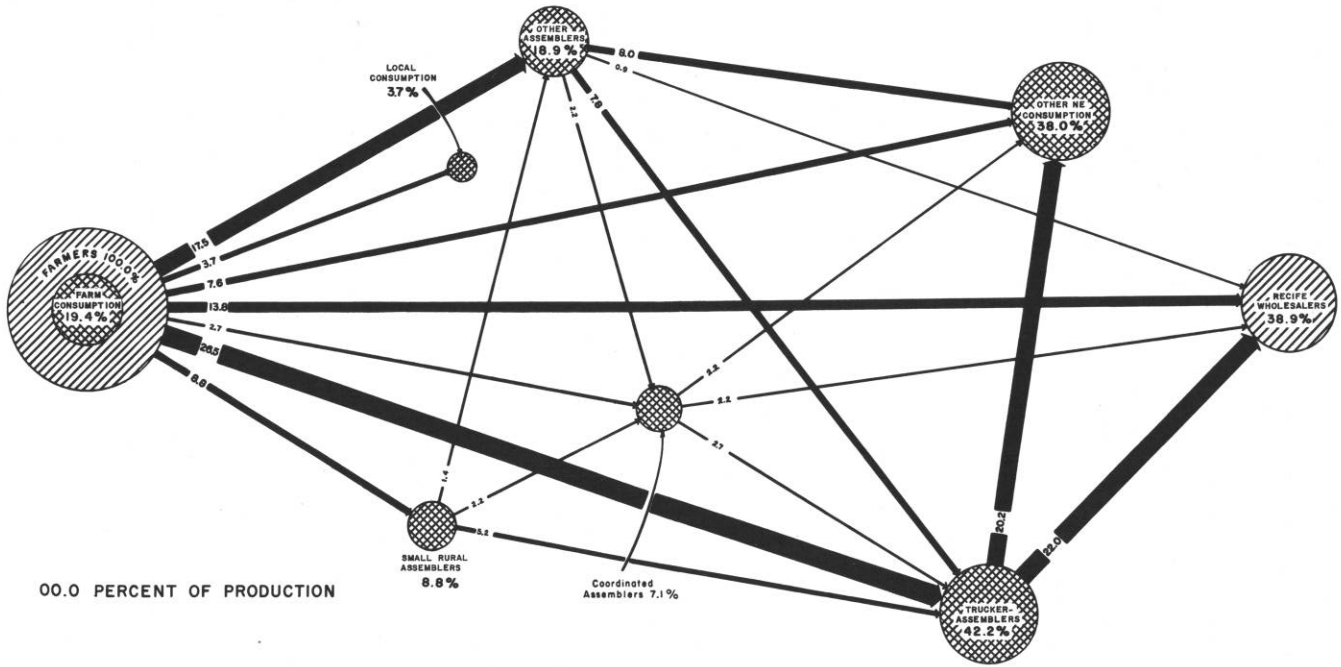


Figure 9.2

BEAN CHANNEL MAP
IRECÊ, BAHIA SUPPLEMENT



00.0 PERCENT OF PRODUCTION

salers (Table 9.7). This compares with less than three transactions for beans moving from the Irecê area in Bahia.

Table 9.7 Percent of Total Beans Moving Through Various Numbers of Market Transactions between Producers and Retailers

Number of Transactions	% of Flow by Area	
	Al-Pe	Irecê
Two	9.0	35.4
Three	51.2	39.5
Four	37.3	21.3
Five	2.2	3.0
Six	0.3	0.8
TOTAL	100.0	100.0
Average number of transactions	3.36	2.94

SOURCE: SUDENE/MSU Assembler Survey (1967).

The channel maps show that large assemblers buy only from large farmers and smaller assemblers. They sell mostly to urban wholesalers. The medium-sized assembler buys from all farmers and some assemblers. He sells primarily to truckers but also to large assemblers and wholesalers. Small assemblers buy primarily from small farmers. Most of their sales are to urban assemblers and local retailers. Small assemblers occasionally sell to truckers as well. Itinerant truckers buy most frequently from producers and sell to wholesalers. Relationships also vary from the large assemblers' and truckers' impersonal relationship with suppliers to the personal relationship maintained by small assemblers with their suppliers.

The actions of itinerant truckers and some large assemblers seem to be very powerful forces of change in the assembly market. Their increasing influence may create more competitive conditions which will bring about a transition from an informal, personal exchange process to a more formal, impersonal process. The most dynamic force may come from outside the system as a changing retail market structure seeks out large-scale suppliers. Increased vertical coordination or integration may be the mechanisms used to achieve these scale economies.

Large coordinated assemblers are usually headquartered in convergence centers. The average yearly volume of these assemblers in the Al-Pe area is estimated at 479 tons of beans and 100 tons of corn versus 495 tons and 915 tons, respectively, in Irecê. (Tables 9.8 and 9.9). The yearly volume for large coordinated bean assemblers interviewed ranged from 100 to 810 tons during 1966, which accounts for the much higher total value of their purchases compared to those of other assemblers.

Large assemblers maintain an average of 6.6 workers. The average annual wage per worker was estimated by them at NCr$1,120. Even large assemblers have no systematic or analytical accounting procedures and are unable to estimate such indirect costs as bad debts, risks of tax collection and total selling costs.

Medium-sized assemblers are specialized commodity buyers with established places of business in a local trading center. These assemblers average about 1/10 of the volume of beans and about 1/3 of the volume of corn handled by large assemblers. Medium-sized assemblers are defined as those with yearly sales volumes ranging from 50 to 240 tons and who sell some beans to other assemblers.

Small urban assemblers live in small towns where they trade in small volume. They usually have other occupations (farming, etc.) and turn to bean buying for less than half the year when working capital is needed to finance the harvesting and marketing of farm production. The small urban assemblers range in size from 1.2 to 108 tons of beans annually.

Case study interviews revealed that one competitive advantage of small urban assemblers is that they are able to avoid the circulation tax.[2] By not paying the tax when the purchase is made from the farmer, assemblers show no margin and are then able to act as if they themselves had produced the beans.

Small rural assemblers are usually located at crossroads or in small villages. It is estimated that there are 179 small rural assemblers in the Al-Pe area and 13 in Irecê. Small rural assemblers range in size from 1.4 to 120 tons per year. Like small urban assemblers, these rural firms also specialize in supplying credit to farmers.

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[2]The circulation tax is a tax on the gross margin--difference between buying and selling price--for any transaction. At the time of the study the margin tax was 18%.

Table 9.8 Structural Characteristics of Average Bean Assembly Firms, Alagoas-Pernambuco

Characteristics	Coordinated Large	Medium Urban	Medium Rural	Small Urban	Small Rural	Trucker
Metric tons beans traded, 1966	479.2	39.4	76.6	25.1	36.8	144.0
Metric tons corn traded, 1966	100.2	23.7	55.2	18.3	14.6	30.0
Total purchases, NCr$1000[a]	141.3	13.1	26.2	8.5	11.5	42.7
Number of suppliers	61	33	143	88	90	--
Major price information sources[b]	W,Tel	W,M,A	W,T,A	A,Mkt	A,T	Mkt,W
Major occupation	Merch	Farm/ Merch	Merch	Farm	Farm	Trans-porter

[a]NCr$278/metric ton for beans and NCr$83/metric tons of corn used as the basis.

[b]W=wholesalers; M=mail; Tel=telegrams; A=assemblers; Mkt=marketplace.

SOURCE: SUDENE/MSU Assembler Survey, 1967.

Table 9.9 Structural Characteristics of Bean Assembly Firms, Irecê

Characteristics	Coordinated Large	Medium Urban	Medium Rural	Small Urban	Small Rural	Trucker
Metric tons beans traded, 1966	495	37.7	42.0	37.4	15.5	60.0
Metric tons corn traded, 1966	915	142.0	48	61.3	8.7	150
Total purchases NCr$1000[a]	253	137.0	18.5	18.3	5.9	207
Number of suppliers	450	15	20	12	62	--
Major price information sources[b]	W	W,T,R	MP,R	A,T	A,T	MP,W

Note: Since relatively few were interviewed in each stratum, considerable sampling error is likely.

[a] NCr$278/metric tons for beans and NCr$83/metric tons corn used as basis.

[b] W=wholesalers; M=mail; T=telegrams; A=assemblers; MP=marketplace.

SOURCE: SUDENE/MSU Assembler Survey (1967).

Itinerant trucker-assemblers travel from market to market specializing in arbitrage activities. They typically deal in 6- to 8-ton lots. Some truckers have their own trucks, while others rent one or more for the purpose of buying, transporting and selling farm products. A few itinerant truckers in the Northeast have done well enough to rent warehouses at several points in the major bean producing areas. According to other buyers, truckers have been effective tax evaders.

Competitive Behavior

Bean assembly markets appear to be reasonably competitive. The large number of buyers in the market has so far prevented the emergence of any strong monopoly elements. The relatively easy conditions of entry and exit contribute to a structure of many small firms. Even with this structure, there are factors which limit competitive behavior. A majority of assemblers, 68%, did not view excessive competition as a barrier to their expansion. The size of firm and a modernity index were both tested against assemblers' views of competition as a barrier. No significant relationships were found. The view held by assemblers that competition was not a barrier to expansion could be due to two factors. One is that, in an atomistic market structure, all firms are able to operate independently without regard for interfirm effects. Secondly, atomistic assemblers who have not felt the effect of a changing market structure are not aware of competition as a barrier.

Competition may also be restricted in these areas by informal procedures among assemblers. The attitude of assemblers toward competition is revealed in the following statement: "The businessmen who pay more in order to buy more are not well regarded by others." Thirty-two percent agreed. When tested against scores on a modernity index, a significant relationship was found. Social sanctions against competition differ among firms (Table 9.10). Among the more modern, 70% believe such sanctions do exist. A plausible explanation for this difference may be that social sanctions against competition exist but not all buyers are aware of them. The traditional buyers who have never paid higher prices to gain a greater market share may be unaware of such social sanctions. The moderns, on the other hand, may have become more price-competitive and discovered that such sanctions do exist.

Price collusion is another means of reducing competition. Each assembler was asked if any of his competitors had ever invited

Table 9.10 Relationship of Scores on Modernity Index to Buyer Attitudes toward Price Competition

Social Sanctions Against Price Competition	Score on Modernity Index		
	Lower Third	Middle Third	Upper Third
Do Exist	47%	18%	70%
Do Not Exist	53%	82%	30%

SOURCE: SUDENE/MSU Assembler Survey (1967).

him to make a price agreement with them. Twenty-eight percent had and 72% had not. These responses were tested for their relationship to the size of firm and modernity index. No significant relationships were found.

The tied sale agreements between assemblers and producers can also restrict the degree of competition in the system. Since most of these loans go to small farmers, the tied sale arrangement can reduce the bargaining power of small producers. However, 76% of the producers said they never sold beans for later payment to anyone. Thus, tied sale agreements and sales for deferred payment may reduce the bargaining power for less than 1/4 of the producers.

Prices and Margins

Since much of the variation in income is due to price variation, it is necessary to compare farm prices in both areas. The over-all average bean price was NCr$0.34 per kilo. The price in the Irecê area averaged NCr$0.41 per kilo and in the Al-Pe area it averaged NCr$0.31 per kilo. Bean prices received by farmers in this sample survey ranged from NCr$0.13 to NCr$0.67 per kilo during 1966. The higher average price received by bean producers in Irecê is associated with a seasonal price advantage, better quality beans and improved market coordination. There was a substantial seasonal variation in the farm price of beans in 1966. The average September price was slightly more than 50% of the price in May, the month with the highest price (Table 9.11).

Assembler gross marketing margins were determined by asking firms what they thought was the minimum mark-up needed to cover all costs and provide a normal profit. An average mark-up of 5.8 centavos per kilo was said to be necessary. This mark-up represents an average of a wide variety of assembler types, some of whom may

Table 9.11 Monthly Distribution of Sales Transactions and Farm Prices, 1966

Month	Percent of Sales in:			Average[a] Farm Price	Price Index
	Irecê	Al-Pe	Combined Areas		
January	4.2%	11.2%	8.8%	30.33	100.0
February	6.9	5.0	5.5	32.59	107.4
March	34.6	2.9	10.4	38.90	128.2
April	24.8	3.5	8.1	40.44	133.3
May	10.3	1.7	5.8	42.61	140.4
June	4.2	--	1.0	40.50[b]	133.3
July	1.5	--	0.3	20.00[b]	65.9
August	--	4.6	6.8	22.40	73.8
September	1.5	19.6	15.7	22.15	73.0
October	1.5	17.5	10.7	31.61	104.2
November	--	19.2	14.9	31.67	104.4
December	1.5	15.0	12.0	31.58	104.1
TOTAL	100.0	100.0	100.0		

[a]Average farm price for the combined areas is in centavos of new cruzeiros per kilo.

[b]Months with less than 10 observations. Data may be biased.

SOURCE: SUDENE/MSU Farmer Survey (1967).

have higher or lower margins than the average. It seems likely that local assemblers who must sell to another intermediary have lower margins than itinerant assemblers who buy at the farm and sell at wholesale or retail. Nevertheless, a general idea of the gross margin of assemblers can be obtained by dividing this average mark-up by a base price calculated by taking the average farm price for 1966 and adding to it the average mark-up indicated by assemblers. The resulting margin is 14.5%.

Market Information

At the present time, the assemblers' main source of market information is from other businessmen in the community (44%), direct observation in the local markets (28%), private radio (9%), commercial radio (7%), out-of-town buyers (5%) and other (7%).

Thus, assemblers do not depend upon the mass media for market information. The main source of information also varies by size of assembler. The large coordinated assemblers rely upon wholesalers and telegrams to the urban center for their information. The itinerant trucker also relies upon wholesalers for his information. Medium-sized assemblers have less contact with urban centers, so they must rely more heavily upon local market information. Small assemblers must rely entirely upon the local market for their information. Thus, large assemblers with direct information contacts have the best information about urban market conditions.

Assembler response to the following question demonstrates that lack of market information can be a barrier: "I can take advantage of my suppliers easily because they don't know much about prices." A significant relationship exists between the size of a firm and its information advantage relative to its suppliers (Table 9.12). The large firms have a greater information advantage relative to suppliers than do small firms. This is not to say that these firms are exploiting suppliers as a result of their position, but only that the opportunity for them to do so does exist. Thus, improved market information could both increase competition and improve the over-all coordination of the system by keeping producers and assemblers well informed.

Table 9.12 Relationship of Size of Firm to its Market Information Advantage over Suppliers

Firm Sales in NCr$	Assemblers Have Information Advantage	
	Agree	Disagree
0 - 42,500	39%	61%
42,501 - 1,000,000	81	19

SOURCE: SUDENE/MSU Assembler Survey (1967).

Sixty-six percent of bean producers learn about prices from the bean buyers, 15% from their neighbors, and 14% obtain their price information at the *feiras*. Less than 1% obtained price information by radio. Thus, it is evident that bean producers are very dependent upon buyers for price information. Bean producers,

on the average, sold to only two different buyers in 1966. Before selling, producers were contacted by an average of three different buyers.

Grading and Quality Improvement

In the bean industry, quality is an important factor affecting the salability of the product. Type, variety, color, cleanliness and the hardness or softness of the bean determine its consumer acceptability. Higher prices can be received for bright, clean and soft beans than for beans having the opposites of these qualities. However, it is difficult to state with accuracy the amount of this price differential.

Buyers normally inspect beans personally at the time of purchase. Beans are inspected for type, variety, cleanliness and hardness. *Mulatinho*, the most preferred type of bean, commands the highest price in the market. Beans begin to lose their softness as soon as they are harvested. As beans harden, cooking time increases and palatability decreases. Cleanliness is another serious problem with beans. Samples of beans bought by project personnel in Recife had 4-5% and even more of their weight made up of rocks and other foreign material. Farmers are often accused of cheating on weights. However, the presence of foreign material may be largely due to primitive harvesting methods. For most assemblers, this personal grading system is expensive and time consuming.

At the time of sale, the weight of each sack is determined on scales generally owned by the buyers. Sixty-six percent of farmers believe that buyers are giving them honest weights, but 24% do not think so. Ten percent do not know whether they are being cheated. About 36% of bean farmers have their own scales which can be used as a check against the buyers' weights.

Only large assemblers who have a good reputation with wholesalers are able to make sales transactions by description. All other assemblers must rely on more expensive methods of transaction. The usual method is taking bean samples to urban markets where wholesalers can inspect the samples prior to purchase. Shipment is then made on the basis of the sample. Occasionally, the buyer discovers that the shipment is of lower quality than the sample. When this occurs, the transaction must be renegotiated. This may mean accepting a lower price from the present buyer or making another trip to the urban center to look for other buyers. Thus, the added expense and risk of selling to wholesalers in the urban markets

are obstacles to more direct selling. The lack of an operational standard for determining grades increases the cost and risk of making market transactions.

There are difficulties involved in communicating consumer preferences to farmers. This problem begins with the retailer who is not aware of consumer preferences and increases as the information must pass through each marketer from retailer to producer. Assembler attitudes toward quality and quality awareness decrease as the signal gets farther from consumers. Quality signals and awareness of quality seem to be quite high between wholesalers and large assemblers, but a major breakdown in the transmission of product quality signals occurs at the small assembler level. As evidence, 78% of all bean assemblers indicated that they recognize what quality of products their buyers prefer and usually supply those needs. Large assemblers transmit quality information to small assemblers, but small assemblers transmit very little quality information to producers. Only 25-29% inform producers of buyer preferences. Thus, assemblers are not effectively transmitting quality information to farmers.

Storage

Bean assemblers have much more storage capacity than bean growers (Table 9.13). Bean growers in Irecê also have more storage capacity than Al-Pe growers, but the Al-Pe growers stored more beans in 1966. The reader is reminded that Irecê bean prices were high at harvest time in 1966 so there was little incentive to store beans.

Table 9.13 Storage Capacity and Actual Quantity Stored by Bean Assemblers & Growers, 1966 (in kilos)

	Bean Assemblers	Bean Growers	
		Irecê	Al-Pe
Storage capacity	116,792	12,540	4,725
Quantity stored two months after harvest	22,033	1,707	2,672
Quantity stored as percent of storage capacity	18.8	13.6	56.5

SOURCE: SUDENE/MSU Assembler and Farmer Surveys (1967).

Because many bean producers (75%) did not store beans, they were asked for the reasons why they did not. Nearly 47% sold their beans at harvest time because they needed money to buy food and medicines for their families. Twenty-two percent sold their beans because of a need to repay a loan. Only 3% thought that it did not pay to store beans. A very small amount (2%) did not have any method of storing beans on the farm. Thus, the need for money seems to be the major reason why producers sell beans at harvest time.

The storage and handling losses for beans are shown in Table 9.14. The total losses are greater in the Al-Pe channel than in the Irecê channel. In both market channels the losses are high and probably could be reduced with improved storage facilities and practices. The amount of quality deterioration which occurs in storage may also be an important factor in determining losses. Because of the difficulty in establishing the degree of quality deterioration in stored beans, no estimate is included in the above data.

Table 9.14 Storage and Handling Losses for Beans in the Al-Pe and Irecê Market Channels (in percent)

Market Survey	Al-Pe	Irecê
Retailer	1.80	1.80
Wholesaler	2.77	2.77
Assembler	3.80	2.38
Producer	8.22	3.14
Total storage and handling loss	16.59	10.09

SOURCE: SUDENE/MSU Marketing Surveys (1967).

The reader is reminded that these losses are based upon the results of survey data. Retailers and wholesalers were asked how much spoilage due to rodents, insects, etc., they had out of each 100 units sold. Farmers and assemblers were asked how much they stored and then how much of what they stored was lost due to insects, rodents, etc. Thus, the loss data are determined by responses to these questions rather than by controlled experiment.

Metal silos are the most popular means of storing beans in rural areas (Table 9.15). With good storage practices, bean storage

losses can be reduced to an insignificant level in these silos. The silos hold an average of 600 kilos and cost about NCr$150. Since they last for about 20 years, the depreciation on the silo is very low.

Table 9.15 Types of Storage Used by Bean Assemblers and Producers

Type of Storage	Percent Using	
	Assemblers	Producers
Metal silos	44%	46%
Sacks in wood or cement warehouse	34	34
Sacks in home	11	19
Bulk storage	2	0
Sacks on ground	7	0
Other	2	1
TOTAL	100.0	100.0

SOURCE: SUDENE/MSU Assembler and Farmer Surveys (1967).

The silos may be purchased ready-made or built on site from sheet metal. They are usually about 2-3 m. tall and 1/2-1 m. in diameter. There is a small hole at the top used when filling the silo and a second small hole at the bottom from which it can be emptied. Once the silo has been filled, the holes are sealed with a wax (usually bees-wax) to create an airtight container. Beans can then be stored in good condition for periods as long as one year. If the moisture content of the beans is 16% or above and the relative humidity is 75% in the silo under normal daytime temperatures of the Northeast, storage life is shortened 3-6 months. However, with a moisture content of 15% or lower for the beans and about 65% relative humidity, the beans can be stored in good condition for more than one year. Insect damage in silos is low if beans are insect-free when stored. If insects are present, beans must be treated before storage. The information available on the problem of hardening suggests that differences in varieties and growing conditions are more important determinants of the rate of seed coat hardening than is length of storage. Storage up to one

year in these silos appears to be an effective, low-cost means of storage.[3]

The average farm price data for 1966 showed a change of about NCr$.20 per kilo in the nine months from harvest (September) to the highest price of the year (May). Storage for this time period would have been profitable, since storage costs are NCr$0.12 per kilo for nine months. This assumes a fixed cost for depreciation and fumigation, but a variable cost for the borrowed money. Fixed costs are NCr$0.03 per kilo and variable costs are NCr$0.01 per kilo per month (Table 9.16).

Table 9.16 Annual On-Farm Bean Storage Costs per Kilogram in Northeast Brazil, 1966

Cost of Item	Annual Cost per Kilo in NCr$[a]
Silo depreciation	0.02
Fumigant cost, etc.	0.01
Cost of borrowing	0.12
TOTAL	NCr$0.15

[a]The calculations assume an annual interest rate of 36% for 1966. Other costs are based upon estimates of actual storage expenses in Northeast Brazil. A charge for losses due to handling, shrinkage and deterioration is not made since this loss is negligible under proper storage conditions.

SOURCE: SUDENE/MSU Case Studies (1967).

Three months' storage would cost NCr$0.06 per kilo using the same procedure. The return for this storage would have been NCr$0.09 per kilo from September to November 1966. Thus, storage would have been profitable in 1966 during the post-harvest period. Storage, however, is not profitable if spoilage rates are high.

Credit

About 41% of all bean assemblers in the survey advanced credit to farmers in 1966. Most assembler loans are made to small farmers whether the source is directly from small and medium-sized assemblers or by large assemblers through small assemblers. Most

[3]This information is based upon a conversation with S.T. Dexter, Crop Scientist, Department of Crop Science, Michigan State University, May 1968.

other farmers rely on bank credit or private capital. Assemblers loaned an average total of NCr$4,765 to all their suppliers in 1966. An average of 34 persons received this credit, which amounts to NCr$140 per borrower. Most of the money is loaned during the growing season and repaid at or shortly after harvest. The average duration of assembler loans to farmers was only 6.6 weeks, so it is very short-term credit.

Among those assemblers who loan money to their suppliers, there were various criteria used to evaluate the suppliers. The criterion used by 71% of the large firms was the amount of production for that particular supplier, while only 9% of the small firms used this criterion (Table 9.17). Thus, the small firms will base their decisions to make loans on more subjective factors, while large firms rely more heavily on the objective factors. Either method seems to give satisfactory results, because the number of bad debt losses does not vary significantly with size of firm. Yet only 62% of all bean assemblers borrowed money in 1966. This is a bit surprising in light of the fact that when assemblers asked what factors prevented them from expanding their business, 87% mentioned lack of working capital and 76% mentioned unavailability of credit. Obviously, some assemblers are content to operate without borrowed capital while some feel they are unable to expand due to inadequate financing.

Table 9.17 Criteria Used in Making Supplier Loans as a Function of Firm Size

Criterion for Loan	Firm Sales in NCr$ 1966	
	1-42,500	42,501-1,000,000
Farm production	9%	71%
Personal ties	63%	22%
Family and kinship ties	28%	7%

SOURCE: SUDENE/MSU Assembler Survey (1967).

The interest rates paid by assemblers depend greatly upon the source of that credit. It is obvious from Table 9.18 that the least costly and most popular source of credit is government banks. The

next most popular source of credit is the moneylender who charges a high rate of interest. Moneylenders make the high risk loans which no one else is willing or able to make.

Table 9.18 Monthly Interest Rates Paid by Bean Assemblers by Source of Credit

Source	Monthly Interest Rate	Percent Borrowing from that Source
Government banks	2.2%	36.4%
Private banks	3.5	18.5
Friends and relatives	2.3	18.6
Moneylenders	4.4	21.5
Other	4.8	5.0

SOURCE: SUDENE/MSU Assembler Survey (1967).

According to the International Monetary Fund, the annual rate of inflation for Brazil was 36% in 1966.[4] At this rate of inflation, assemblers can borrow from government banks for an interest rate less than the rate of inflation. Private banks and moneylenders charge positive interest rates. Because of their own interest rates, government banks must ration their credit. Thus the high cost of credit is a limiting factor only for those who borrow from non-government banks. The loans from government banks are actually a subsidy at this rate.

The most urgent credit problems are the high interest rates which some assemblers pay and the shortage of capital for assembly market operations. The credit which assemblers advance to producers is also primarily in the form of production credit. A shortage of marketing credit appears to exist for both assemblers and producers.

Transportation

The types of roads on which rural assemblers are located and for those in town the types leading into the town may be a severe limitation on the marketing system. The largest percentage (25%) of the assemblers interviewed lived on a road traveled only by ox-

[4] International Financial Statistics, International Monetary Fund, Washington, D.C., Vol. 14.

cart. The next largest percentage (24%) lived on graded dirt roads, and 15% lived on cobblestone streets. The rest lived on ungraded roads. The reader is reminded that a majority of bean producers lived on roads that can be traveled only through use of an oxcart.

The approximate importance of the several modes of farm-to-assembler transportation is seen in Table 9.19. This table indicates the greater importance of primitive means of transportation in Alagoas and Pernambuco than in Irecê. This is partially due to roads with greater year-round accessibility to farms in Irecê, even though unimproved. In the Al-Pe area the lack of adequate roads in rural areas results in the need for beans to pass through additional transactions from field to farmhouse to village. This additional handling by traditional methods is costly. Moreover, even after beans are collected by trucks in the villages, the costs of transportation to assembly centers are great. As a result of poor road conditions, the real rate of truck depreciation is frequently high.

Table 9.19 Predominant Modes of Bean Transportation to Assemblers (Percent of Assemblers)

Modes of Transport	Al-Pe	Irecê
Animals	16.3%	15.0%
Oxcarts	58.2	16.1
Others (on foot, etc.)	6.6	0
Total traditional modes	81.1	31.1
Independent truckers	13.3	21.3
Shipping company trucks	1.8	1.4
Assemblers' trucks	3.6	46.2
Total motorized modes	18.7	68.9

SOURCE: SUDENE/MSU Assembler Survey (1967).

A poor transportation system increases the geographic isolation of assembly markets. These conditions create imperfectly competitive product and factor markets. Competition from the outside, particularly from itinerant truckers, is lessened because of this isolation. In addition, poor roads place a physical limitation on

the scale of transaction. Poor roads perpetuate the existence of many small firms which handle these small-scale transactions.

Summary

A large number of small buyers and a few large buyers are characteristic of the structure of bean assembly markets. The market structure is characterized by several types of buyers, each of whom possesses a certain degree of functional specialization according to his abilities and location in the system. Large firms are generally specialized commodity buyers, whereas small firms rely upon other occupations and enter the market system for only part of the year. Large and medium-sized firms are more heavily involved in storage, while small assemblers specialize in supplying farm credit. There are a few large firms which recognize their stronger position in the market and many small firms have virtually no individual influence upon aggregate output or price.

The market structure is changing slowly as competitive pressures force the smaller, less efficient firms out of business. This appears to be taking place more rapidly in Irecê than in the Al-Pe area. One identifiable trend is the continued rise of itinerant trucker-buyers whose direct buying from producers and selling to wholesalers has forced some traditional assemblers out of business. Changing urban markets will increase the competitive pressures on traditional assembly markets through the increased use of vertical coordination to reduce costs and stabilize supply. The trend toward fewer and larger firms will likely continue in response to the changing needs of the urban markets. The potential exists for a substantial reduction in the number of firms.

Analysis of the market channels revealed that each type of buyer has a differentiated group from whom he buys and also to whom he sells. These assemblers are also specialized in the services they perform for suppliers. The relationships were found to be quite stable, although some changes are taking place. One of these changes is the use of order buying between wholesalers and large assemblers who have developed confidence in each others' samples. Another is the increasing market share purchased by itinerant trucker-assemblers. The trucker activities which increase the competition at all levels in the channel tend to break down some of the traditional buying and selling patterns. Future trends will be continuing growth in the proportion bought directly from producers with a decline in purchases from other assemblers. Another change will

likely be the emergence of assembler sales directly to the large-scale retailers. While unimportant at the present time, it is probable that retail market changes will lead to vertical coordination or integration in an effort to meet competitive pressures.

The channel maps summarize the basic differences in buying and selling relationships for both the Al-Pe and Irecê areas. The Irecê channel has fewer types of buyers who handle larger market shares. A greater share of production is purchased directly from producers and sold to wholesalers in the Irecê channel. Because of this, fewer transactions are needed to move the goods through the market channel.

The analysis of market performance has revealed several problem areas which suggest that poor coordination does indeed increase the level of market risks and uncertainties. Large spatial price differences were found in bean assembly markets.

Gross margins of assemblers averaged 14.5% of their selling price. No gross margin differences were found between firms. These margins were considered to be reasonable, given conditions in the Northeast. Increased competition would probably do little to lower assembler margins. The bypassing of certain intermediaries in the channel through increased vertical integration and/or coordination appears to be a mechanism to lower the cost of marketing.

Price instability and supply uncertainty are barriers to expansion for a majority of assemblers. Some assemblers stabilize supply through the use of credit with tied sale arrangements.

Ease of entry and exit keeps bean assembly markets reasonably competitive in terms of numbers of firms. Most assemblers (68%) did not view excessive competition as a barrier to expansion. The more modern firms believed that social sanctions against aggressive price competition do exist. The possibility of price collusion exists but does not appear to be a serious problem. A "live and let live" attitude seems to prevail. Thus, large numbers of small firms do not always imply aggressive competition.

Little market information is available through the mass media at the present time. Large assemblers who get market information from the urban centers are the best informed group of assemblers. Medium and small-sized assemblers must rely upon other assemblers for their information. Such information is generally inadequate and frequently inaccurate. Most large assemblers (81%) agreed that they have an information advantage over

their suppliers. Producers also obtain price information from the local assemblers. No outside source of market information is available.

The lack of an effective grading system increases the cost of sales transactions. Only large assemblers with good reputations can make sales transactions by description. All other assemblers must bring samples to buyers and make the sale in person. This is expensive and time-consuming. Information on product quality (color, cleanliness, etc.) seems adequate between large assemblers and small assemblers and poor between small assemblers and producers.

Bean assemblers have more storage capacity and store more beans than producers. Large assemblers store more than small assemblers. A shortage of credit, risks of price change, and spoilage risks are important barriers to bean storage among assemblers and producers. Large firms, however, perceive fewer barriers than small firms. Storage and handling losses are high, 16% and 10% in the Al-Pe and Irecê market channels, respectively. Less than half of the producers and assemblers use the metal silo, which is the most effective means of storage available in these areas. Storage in the post-harvest season for 6-9 months would have been profitable in 1966 if storage losses had been kept low.

Poor roads force 81% of assemblers to use non-mechanized means of transportation when buying from the producers, limiting the scale of assembly firms and reducing competition because of geographic isolation of buyers and sellers.

Most assemblers (87%) say lack of working capital keeps them from expanding sales, yet only 62% borrowed money in 1966. Interest rates from government banks are lower than the rate of inflation (36% annually), but interest rates from private sources are high. Assemblers advance production credit to producers, but both assemblers and producers appear to lack marketing credit.

The Rural Marketing System for Rice

Introduction

Rice is a basic food for half the people in the world, and it is one of the staple foods in the Brazilian diet. Rice consumption in Brazil for 1960 was 38.4 kgs. per capita in urban areas and

40.3 kgs. per capita in rural areas.[5] Among cereal grains, only wheat has a higher rate of consumption.

Supply-demand projections to 1975 for Brazil indicate a rapid increase in rice production and consumption with no significant surplus or deficit (Table 9.20). However, Northeast Brazil is a deficit rice producing region importing large quantities of rice from central-southern regions of the country (Table 9.21).

Table 9.20 Rice Supply and Demand Estimates in Brazil, 1965 & 1975 (1000 tons)

Year	Actual demand	Internal supply	Actual surplus
1965	5,880	5,930	+50
1975	11,320	11,420	+100

SOURCE: Getulio Vargas Foundation, *Projections of Supply and Demand of Agricultural Products for Brazil*, Vol. 1, 1966, pp. 153-55.

Table 9.21 Rice Imports into the Port of Recife 1963-1966 (in tons)

Region of Origin	1963	1964	1965	1966
North	401	1,040	2,055	N.A.
Northeast	538	2,481	179	N.A.
Center-South	7,850	7,559	16,274	26,417
TOTAL	8,789	11,080	18,508	26,417

SOURCE: Dados Estatísticos do Administração do Porto de Recife, 1963, 1964, 1965, and 1966.

Most of this rice arrives in the Northeast through the Recife port, though some movement is by truck. There are wide variations in the quantity of rice entering the Recife port from both the North and

[5] Getulio Vargas Foundation, *Projections of Supply and Demand for Agricultural Products of Brazil* (Rio de Janeiro: Getulio Vargas Foundation, 1967), Vol. 1, p. 49.

the Northeast. There is no consistent trend in Recife purchases from these areas. At the present time neither of these areas is an important source of rice supplies for Recife and the surrounding area. Some rice from Maranhão enters the Recife market by truck, but it is a small amount. Much more rice is trucked to Recife from the São Francisco River Valley in Alagoas and Sergipe. Imports from the Center-South show a very strong upward trend, indicating that it is an extremely important source of rice in the Recife market. It is evident that local rice production has been unable to meet the growing demand in the Northeast.

Since the urban market being analyzed in this research project is Recife, the consumption and production for this population was studied. Table 9.21 shows that virtually all the rice consumed in Pernambuco is imported from other states, mainly from Rio Grande do Sul (in 1960 about 75 to 85% of the rice consumed in Recife came from that state). Rice from Alagoas, Sergipe and Maranhão is also sold in Recife.

The South and Middlewest are the principal rice producing areas in Brazil, accounting for more than 70% of the total output in 1963-65. The Northeast produced only 13% of the Brazilian rice during the same period.

The highest average rice yields are in the South in Rio Grande do Sul, with relatively low yields in the Northeast producing areas (Table 9.22).

Table 9.22 Rice Yield per Hectare in Selected States[a], 1960, 1963-65 (kilos)

States	1960	1963	1964	1965	% Change
Alagoas	1,722	1,446	912	1,043	-39
Sergipe	2,144	2,169	2,248	2,269	6
Maranhão	1,047	1,452	1,377	1,387	33
Rio Grande do Sul	2,602	3,310	3,017	2,901	12

[a]Yields are in kilos of unhulled rice per hectare.

SOURCE: IBGE - Statistical Annuals of Brazil: 1963, p. 62; and 1966, pp. 101-102.

Description and Evaluation of the Rural Assembly System

Market Structure

It is clear from the foregoing discussion that there are only two major rice producing areas within the Northeast supplying the Recife market. The most important of these appears to be the area along the lower São Francisco River. Rice production there is characterized by stable, though traditional, cultivation practices with natural river flooding for irrigation. The other rice producing area in the Northeast is located in Maranhão. In that area the predominant form of cultivation is slash and burn, using hand labor almost completely.

In both areas the rural assembly system is organized around the rice miller. Virtually all rice is milled before leaving the production area. In the São Francisco area, rice appears more often to move directly to the miller. In Maranhão, a small assembler usually purchases from the farmer and sells to a miller. Thus, rice produced in Maranhão passes through more intermediaries than rice from the São Francisco areas and must, therefore, bear greater marketing costs and consequently lower farm prices, since Recife consumers are not willing to pay higher prices for the same or lower-quality rice from Maranhão in competition with rice from other areas.

The following two sections discuss the results of farmer and assembler surveys, respectively, in the two areas described above. An effort is made to identify the organization and operation of the rural rice assembly system in those areas.

Farmer Marketing Activities

On the average, rice farmers in the São Francisco area are much larger than Codó (Maranhão) rice growers. Table 9.23 shows that in 1966 the average quantity harvested per farm in São Francisco was 33.8 metric tons compared to about 7 metric tons per farm in Codó. Farmers sold about 80% of the total in both areas. The remainder apparently was consumed at home, or saved for seed. Rice sales per farm were much larger in São Francisco than in Codó and were a higher percentage of gross farm income (86% versus 29%). This suggests that São Francisco farmers are well into the specialized commercial production of rice, while Codó farmers remain small and semi-subsistence. Moreover, part of the difference in total rice sales between the two areas is due to the much lower price level in Codó as compared to São Francisco.

Table 9.23 Rice Production & Sales Characteristics per Farm by Areas for 1965 and 1966

Characteristics	São Francisco		Codó	
	1965	1966	1965	1966
Quantity rough rice harvested (kilos)	31,606	33,856	6,697	6,999
Quantity rough rice sold (kilos)	26,360	27,121	5,508	5,463
Rice sold as percent of rice harvested	83.4	80.2	81.4	78.1
Rice sales 1966 (NCr$)	N.A.	5,379	N.A.	605
Total farm sales	N.A.	6,255	N.A.	2,100
Rice sales as percent of total farm sales	N.A.	86.0	N.A.	28.8

SOURCE: SUDENE/MSU Survey (1967).

The average number of rice sales made in 1966 was almost six sales per producer. The Codó average was 7.2, while the average in São Francisco was 4.7. The smaller number of sales and the larger total output for São Francisco producers indicates a higher average size of transaction when compared to Codó producers. The important marketing months in Codó are May, June and July with some activity in August. In São Francisco the important months are July through November. The single most important month is October. Thus, the Recife market is most likely to be short of rice from the Northeast from January through April.

Twenty percent of the rice producers sold all or part of their rice before harvest. Two-thirds did this because they needed the money advanced by the buyers. Eighty-seven percent of the producers who sold before the harvest said they thought they could have gotten a better price if they hadn't had to make the advance sale to get cash. Fifty-seven percent of the rice farmers sold rice and waited to be paid at a later date, which was usually about a month after delivery of the rice to the buyer. However, the itinerant buyers from outside the community usually had to pay cash.

Types of Buyers

The types of buyers with whom most transactions are made are listed in Table 9.24. Of those listed, local truckers, buyers,

processors and transitory buyers are the most widely used. The main difference between the two areas is the fact that some sales are made directly to large city buyers by producers of the São Francisco area. This is evidence of a modernizing trend in the rice marketing channels from those areas. The most important sales outlet for producers in both areas is the processor or miller. Local buyers and itinerant merchants are the next most frequently mentioned sales outlets for farmers in the two areas.

Table 9.24 Percentage Distribution of Farm Rice Sales by Types of Buyers, 1966

Buyer type	Codó	São Francisco	Average size of transaction combined areas (kilos)
Landowner	5.3	3.6	2,920
Local buyer	26.3	16.2	2,364
Miller	49.1	49.4	11,071
Itinerant buyer	12.3	17.9	15,004
Recife wholesalers	N.A.	1.6	N.A.
Other wholesalers	N.A.	6.8	15,715
Feira	7.3	1.6	3,180
Others	N.A.	2.9	N.A.
TOTAL	100.0	100.0	N.A.

SOURCE: SUDENE/MSU Farmer Survey (1967).

The average transaction size for the two combined areas was largest (over 15 metric tons) for itinerant and other city wholesalers. This average size would amount to a good-sized truckload and is surprisingly large in comparison to transaction sizes for other commodities. Even the average transaction sizes between small local buyers and farmers exceed 2 tons. The transaction sizes in the São Francisco area far exceed those of the Codó area and tend to pull the combined average up. This points, again, to the fact that producers are highly commercialized in the São Francisco area.

Assembler Characteristics and Channel Maps

The principal flows of rice through the market system serving the São Francisco and Codó areas are presented graphically in Figures 9.3 and 9.4. The circles on the maps indicate the transaction points in the channels, and the percent of product handled is indicated. The relative importance of each flow is represented by the width of the connecting lines. Also, the percent of product movement through each channel is indicated numerically in a small box within the connecting line.

The SUDENE/MSU field surveys of producers, assemblers, wholesalers and retailers provided most of the data used in constructing the channel maps. These survey data were supplemented by follow-up interviews with selected market operators, direct observations by researchers and the use of secondary data. At best, the maps are reasonable approximations of market relationships for the specific areas studied and for the conditions that existed during 1966. The maps are probably not representative of the entire Northeast.

A relatively smaller number of firms buy rice in the lower São Francisco River Valley as compared with Maranhão. There are about 158 rice assemblers of all sizes in the São Francisco rice area and about 465 in northern Maranhão. Table 9.25 shows the estimated number of assemblers in each of the types shown in the channel map. Estimates based on these data and total production in the survey area suggest that for the Codó area there is an average of one assembler for every 132 tons of unhulled rice versus 232 tons in the São Francisco area. Thus, assembly is a larger scale process on the São Francisco River.

Table 9.25 Estimated Number of Assembly Firms by Types for the Two Areas under Study, 1967

Type of Assembly Firm	São Francisco	Codó
Large coordinated millers	2	1
Other millers	33	N.A.
Medium-sized assemblers	25	N.A.
Small assemblers	95	360
Itinerant trucker-assemblers	3	N.A.

SOURCE: SUDENE/MSU Survey (1967).

FIGURE 9.3

RICE CHANNEL MAP

LOWER SÃO FRANCISCO RIVER VALLEY

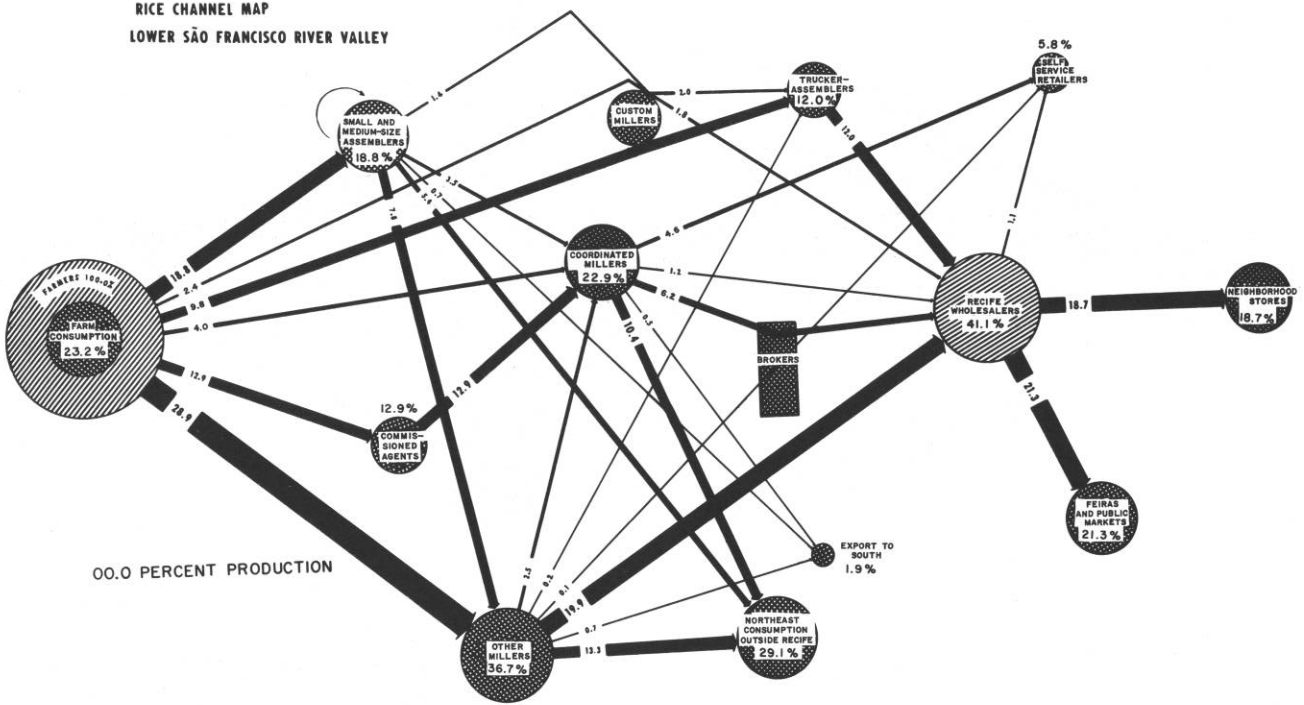
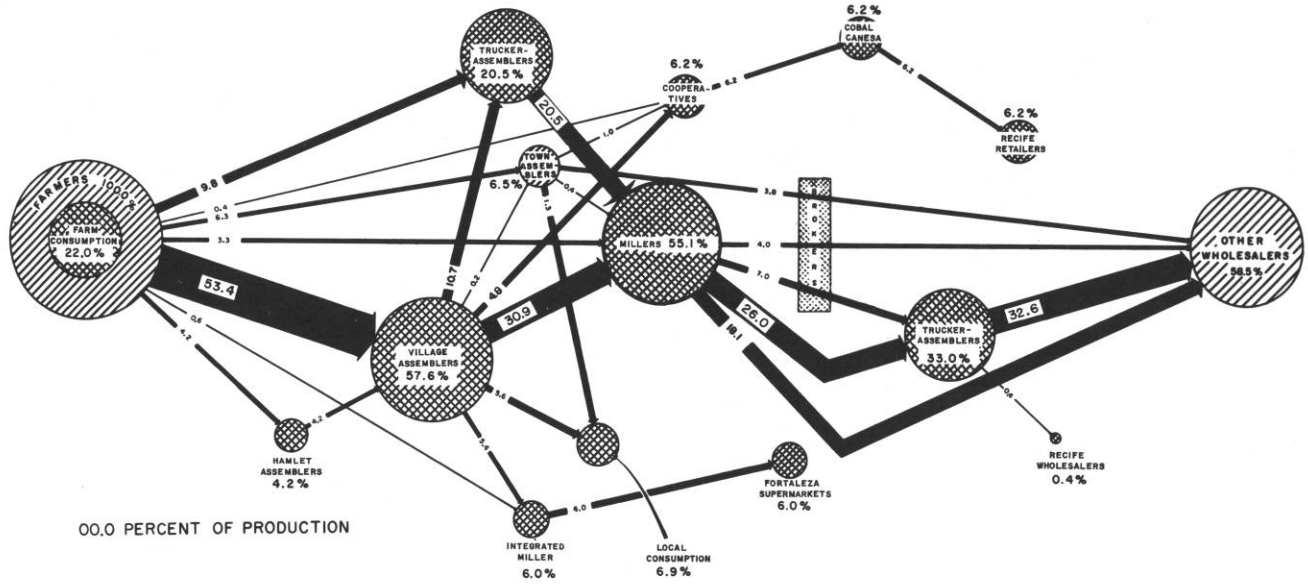


FIGURE 9.4
RICE CHANNEL MAP
MARANHÃO SUPPLEMENT



00.0 PERCENT OF PRODUCTION

There are 35 millers operating in the area of the São Francisco River Valley studied (covering about 3/4 of the rice flowing out of the entire lower valley). Two of those are large-scale mills which have developed direct sales agreements with large-scale retailers. This is one of the first examples in the Northeast of the market channel simplification through both vertical integration and internal market coordination. That is, one retail firm chose to bypass intermediaries in the marketing system by purchasing and managing their own rice mill which purchases direct from large farmers. In the other case a miller chose to bypass wholesalers and attempt to market his product directly to retailers through informal supply arrangements. These efforts to simplify the rice channel appear to have been successful for the firms involved. There is also evidence that the total marketing cost has been reduced through such efforts.

A similar example of channel simplification through vertical integration and control exists in the Codó area. There a Fortaleza retail chain has its own rice mill for supplying three supermarkets. The Fortaleza chain uses rice as its major low-margin leader with such success that rice makes up 17% of its total sales. The Recife supermarket also sells rice at prices significantly lower than other retailers.

Other millers in both São Francisco and Codó either make their own purchases from farmers and assemblers or act as custom millers. In the São Francisco area, these millers purchase most often directly from farmers and are the most important buyer for rice growers. However, millers in Codó make few farm purchases. Rather, they depend on small assemblers. The major sales outlet for millers in both areas are wholesalers, though itinerant truckers are also an important buyer for millers in Codó.

The existence of a few specialized custom millers and assemblers, who use their services, appears to have a beneficial effect in the two areas studied. On the one hand, it permits millers with large fixed investments in equipment but poor supply sources to utilize their investment more efficiently. On the other hand, assemblers have the opportunity to partially integrate beyond the milling stage by paying for custom milling of their rice purchases.

In addition, there is an indirect benefit to larger farmers. Since the custom millers stand ready to process anyone's rice at fairly well-publicized rates, larger farmers have the opportunity to arrange custom processing and bypass both assemblers and miller-buyers in order to sell their rice in processed form directly to

wholesalers or brokers. This provides a potential competitive force against the abuse of bargaining power by millers.

A comparison of the channel maps for the two areas suggests that more intermediaries are now required to move rice to urban retailers from Codó producers than from São Francisco producers. Table 9.26 confirms this. The average number of transactions is 4.35 for Codó and 3.13 for São Francisco.

Table 9.26 Percent of Total Rice Moving Through Various Numbers of Market Transactions between Producers and Retailers

Number of transactions	Percent of total rice	
	São Francisco[a]	Maranhão[b]
One	0.1	0.9
Two	4.6	7.5
Three	78.0	9.6
Four	16.9	33.0
Five	0.4	36.9
Six	N.A.	11.4
Seven	N.A.	.7
TOTAL FLOW	100.0	100.0
Average number of transactions	3.13	4.35

[a]Percent of rice flowing to the Recife market from the São Francisco area.

[b]Percent of rice flowing to urban areas in Maranhão.

SOURCE: SUDENE/MSU Assembler Survey (1967).

The average rice assembler and miller in the two combined areas purchased 605 tons per year from 82 suppliers (either farmers or other assemblers). He has about 6 full-time workers with a weekly wage bill of NCr$154. The wide range of responses on each of the above characteristics with a few very large assemblers makes these averages somewhat misleading. Nevertheless, they, along with the range and medians reported in Table 9.27, are useful to give a general idea of assembler characteristics. It is interesting to note that approximately 61% of assemblers in the survey listed rice

trading as their major occupation. Only about 27% mentioned farming as their primary occupation, in contrast to other product assemblers.

Table 9.27 Structural Characteristics of Rice Assembly Firms, 1967

Characteristics	Range	Median	Average
Metric tons rice traded, 1966	3-4,800	140	605
Total purchases NCr$1000	72-1,161	N.A.	146
Number of suppliers	3-998	29	82
% Major occupation farmers	N.A.	N.A.	26.8
Number of full-time workers	0-98	2	5.8
Weekly wage bill NCr$	0-1,500	80	154
% Major occupation assemblers	N.A.	N.A.	60.6

SOURCE: SUDENE/MSU Assembler Survey (1967).

Competitive Behavior

There is some evidence to suggest significant spatial differences in the intensity of competition among rice assemblers. In particular, the competition seems to be greater among assemblers and millers who are located in the market convergence centers such as Penedo and Propria. On the other hand, small assemblers and millers in villages and rural areas often find themselves competing directly with only a few other buyers. In such cases, informal market sharing arrangements often evolve; assemblers also avoid direct competition through supplying credit and developing close ties with their farmer-suppliers, and either tacitly sharing the market or through overt collusion.

Several observations on expected structural and competitive trends are relevant. There appears to be excess rice milling and assembler capacity in the areas studied, especially in the São Francisco area. There are indications that more small mills will leave the market than enter it. Rising production in the area may offset

this trend to some extent. However, it seems apparent that non-milling investment opportunities for possible entrants are greater today than when the average small miller entered the market about 14 years ago. Thus, as the upkeep of old mills becomes too costly, it is likely that many mills will leave the business and not be replaced. As an indication of this trend, there are presently over ten idle mills in the São Francisco area (Table 9.28).

Table 9.28 Indications of Assembler Propensity to Exit from Market

Item	Codó	São Francisco
Percentage of assemblers who would be willing to migrate to the city	19%	7%
Assemblers are willing to migrate for an average monthly wage of:	NCr$342	NCr$500
Percentage who prefer to invest in other business than rice	53%	22%
Percentage who have a second more important occupation	47%	58%

SOURCE: SUDENE/MSU Assembler Survey (1967).

Under present conditions there is little possibility of the industry attracting new capital into milling on a larger scale. As evidence of this, the larger firms, due to intense competition, have been investing profits in other businesses rather than plowing them back into the milling business. This will probably not change until the small millers are reduced in numbers by the attrition process described above or until a series of especially bad years speeds up that process.

One merger is known to have taken place in the area. It appears to be an exception. In this case one medium-sized firm sold more than half of its stock to a large firm as a preferable alternative to bankruptcy. However, the machinery was new enough to interest the buyer, while other mills might be too old to attract investment. It is possible that a form of quasi-mergers could be an alternative wherein small millers would close their mills and become commissioned buyers for the larger millers. However, it is

unlikely that this phenomenon will become widespread, since many small millers are nearing retirement age.

The trend toward custom milling could persist. More and more millers may find that their best alternative to closing the mill is to accept rice for milling on a commission basis.

Two additional trends are likely to continue. Transportation improvements will give large millers in the major convergence centers greater direct access to producers. The additional competition will probably strengthen the previously described trend toward fewer and fewer local small-scale assemblers and millers. In addition, direct sales arrangements or vertical coordination trends are likely to continue. As more and more large-scale retailers appear in the major consuming centers, there will be added competitive pressure for them to reach back directly to millers or producers in order to reduce prices and control product quality. However, it appears quite likely that the two millers in the São Francisco area who now sell direct to retailers will satisfy this demand for some time to come.

Prices and Margins

The price received by São Francisco producers in 1966 averaged NCr$0.18 per kilo for unhulled rice (the equivalent price for hulled rice was NCr$0.27 per kilo). In Codó, the average price received by rice producers was NCr$0.11 in 1966. The lower price received by Codó producers is due mainly to a lower quality rice which has little consumer demand in the Recife market. The lower price is also due to less market coordination and greater costs of transportation from farm to market. For these reasons the average price received by Codó producers was only 65% of the price received by São Francisco producers.

The average retail price of rice in Recife at the time of the 1967 MSU/SUDENE survey was 78 centavos (NCr$) per kilo at traditional retail outlets (*feiras*, public markets and neighborhood stores). The average retail price at a large-scale retail outlet that had vertically integrated back to a rice mill was 68 centavos (NCr$) per kilo (Table 5.13, Chapter 5). This lower price reflects, in part, a policy of using rice as a price leader at the retail level. However, it also reflects cost reductions in the direct procurement and milling of rice in large volumes and the bypassing of a costly wholesaling system based upon small-scale transactions that are tied in with high-cost credit.

Market Information

Table 9.29 shows that both farmers and assemblers depend on informal and sometimes less reliable word-of-mouth transfer of market information. Market observation is an especially important way in which farmers keep themselves informed about market prices. Rice farmers appear to have much less direct dependence on their buyers for price information than do producers of other commodities analyzed in this study. Only 5.8% mentioned assemblers as their main source of price information. Nevertheless, since their main information source is observation at local markets where assemblers are active traders, the price information source is indirectly those rice assemblers. The major difference between a farmer obtaining price information from his buyers and through personal market observation is that in the first case he must trust that the buyer is offering unbiased information, whereas in the latter situation he can observe several different transactions in the local market and form his own opinion. Moreover, 70% of the farmers indicated that they had contacted more than one buyer for price quotations before selling. Some assemblers tend to depend on each other for price and market condition information. The smaller

Table 9.29 Major Sources of Market Information for Rice Farmers and Assemblers, 1967

Source	Farmer	Assembler	
	Price information (%)	Price information (%)	Market information (%)
Assemblers	5.8	32.0	28.5
Market observation	72.7	16.9	10.3
Brokers or wholesale agents	N.A.	9.5	6.5
Relative or neighbor	16.2	N.A.	N.A.
Telegram and commercial radio	N.A.	12.2	21.7
Radio	1.3	23.7	17.9
Other	N.A.	5.7	15.1
TOTAL	100.0	100.0	100.0

SOURCE: SUDENE/MSU Survey (1967).

rural assemblers especially tend to fall into this category. But a variety of other sources were mentioned, including telegrams and two-way radios and regular radios, which were used by surprisingly high percentages of all assemblers.

It appears that, while informal and word-of-mouth communication is the major source of market information for both rice farmers and assemblers, the system as a whole does not leave either group with a great disadvantage. Assemblers are starting to develop independent sources of market information. In short, distortions in market communications no doubt remain, but progress is being made and conditions do not appear as critical as in other commodity areas.

Inspection and Quality Control

The inspection and quality control activities of buyers vary between areas and among buyers in the same areas. In the São Francisco area the buyers who have rice mills generally inspect and weigh the farmers' sacked rice at the mill. Buyers without mills generally make purchases at the farm after personal inspection of the rice. Often the buyer purchases rice in bulk at the farm where he bags it himself for transport. Occasionally farmers sell without personal inspection by the buyer, but this is done only if the two are well acquainted and have developed trust in each other through many previous satisfactory dealings.

In Codó the inspection of rice is also generally made on the farm by buyers who may then have the rice sacked and shipped to the rice mill. In both areas the buyer usually has the scale and farmers normally accept the weight given by buyers. Forty-five percent of rice producers in the sample believed that buyers were not using honest weights while another 7% of producers did not know whether buyers were honest or dishonest. Forty-two percent of the farmers have their own scales which can be used as a check against the weights stated by buyers. On the other hand, 77% of the assemblers indicated a belief that farmers purposely leave excess straw, sand, or small stones in the rice in order to increase the weight and take advantage of the assembler. Dishonest practices by both farmers and assemblers may offset each other, but in the process the quality of the rice is reduced, leaving Northeastern rice at a competitive disadvantage to the higher quality rice from southern Brazil.

Most assemblers (55.8% in São Francisco but only 31% in Codó) agree that buyers do not transmit their quality needs to the farmers.

Moreover, 28% of the assemblers feel it is futile to try to get farmers to improve rice quality in response to market demand. It is clear that distinctions between types or grades of rice increase as the product gets closer to consumers. The price differential between comparable grades at the assembler level is much less than at the retail level. Small assemblers, at most, distinguish between two to three grades, which are usually based on moisture and straw content. Discoloring and the size of the grains usually are not considered in quality determinations at the small assembler level. Finally, only about 43% of the assemblers feel that the rural assembly system is supplying the quality of rice preferred by wholesalers, retailers and consumers.

Storage

Farm storage of rice in the areas studied takes on various forms. The rice itself is stored in three forms: unthreshed rice in Codó, unhulled and hulled rice in both areas. The unthreshed rice stored in Codó is left in straw-covered sheds or in piles on the ground, where it is subject to all kinds of weather and insect damage. The result of such storage practices is heat-damaged, discolored rice kernels and empty, broken kernels due to insects. The most common type of storage is storage of the unhulled rice, because rice keeps best in this form. Unhulled rice is stored both in bulk and in sacks. After rice is hulled, it may be stored for a short time, but is generally marketed immediately.

According to the survey, 42% of rice farmers stored unhulled rice in their homes or in a warehouse. Six percent said they stored it in sheet metal cylinders (*vasos*) on the farm. Thirty percent stored the unhulled rice in sacks and another 9% stored the rice in boxes on the farm. Thirteen percent had no storage facilities.

On the basis of the survey data it is estimated that rice producers in Codó stored an average of 9,450 kilos and in the São Francisco area an average of 15,410 kilos were stored in 1966. As one would have expected, more rice was stored in the São Francisco area because producers are better informed about storage practices and have much larger rice production.

According to the survey data, storage losses after threshing are extremely small in the rice areas. Based on total quantity stored, losses in the São Francisco area were 1.1%, while losses in the Codó area were 1.8%. The higher losses in Codó were to be

expected because of the methods of storage presently in use there. Case studies made in Codó indicate that losses run as high as 20% to 40% of the rice being damaged prior to threshing and while in storage on the farm. Only about 11% of the Codó farmers reported using fumigants compared to 27% of the São Francisco area farmers.

An attempt was made to identify some of the problems associated with farm storage by asking producers why they did not store some or more of their production. Thirty-nine percent of the 154 interviewed said they sold their rice immediately because they needed money to buy food and medicine for the family. Another 34% sold at harvest time because they needed to pay off a loan. The balance of farmers gave a variety of other responses. This suggests that for about 3/4 of the farmers the lack of credit is an important factor limiting additional farm storage.

Due to inadequate farm storage facilities, inadequate credit, and other factors, it is estimated that the millers store most of the rice in the Northeast. This is probably one of the major aspects involved in their bargaining power with farmers and wholesalers. All millers interviewed in Maranhão and 94% of those interviewed in the São Francisco area stored some rice for at least a month. Four months after the harvest, the average miller in Codó still had 417 tons in stock, while 244 tons was the equivalent average for the São Francisco area. The average estimated loss, using the amount in storage after four months as a base, was stated as being .67% in Maranhão and .74% on the São Francisco River. These smaller percentage storage losses are probably due to the fact that 53% of all assemblers use some type of rat control and 43% use fumigants for controling insects. In most cases millers store in warehouses or storerooms with permanent floors, but they occasionally use facilities with tarpaulin-covered dirt floors. Generally, storage capacity, like milling capacity, is in excess of needs. Average storage for the firms interviewed was 590 square meters in Codó and 714 square meters in the São Francisco area.

Credit

Rice assemblers, especially in Codó, are an important source of short-term farm credit. When farmers, for one reason or another, do not borrow from government banks or find this source inconvenient, their next step is to seek credit from the miller or assembler with whom they deal. Among all rice farmers interviewed, 12.2% of their credit came from the assemblers. In the two combined areas, about 81% of assemblers provide credit to farmers. The average total credit

advanced to farmers per assembler was NCr$17,900. This credit volume was distributed among an average of 34 farmers per assembler.

In Maranhão, credit in the form of goods is more prevalent than in the São Francisco area. Over 1/3 of the loans in Maranhão are in the form of goods, while the figure is insignificant along the São Francisco River.

According to assemblers in the São Francisco area, they charge an average interest rate of 2.6% per month. This rate is not much above the interest rate being paid for farm loans at banks. However, assemblers often pay less than the market price for rice to those who are in debt to them. There was little success in obtaining information on the true interest rates charged. Large coordinated millers usually supply less credit to producers and do so mostly through commissioned agents. No responses were obtained on interest rates in Codó.

A large percentage of assemblers themselves obtain credit for business operations. In 1966, nearly 66% of interviewed assemblers had obtained some type of loan. Of all loans granted to assemblers, the most frequently mentioned (43%) lender was a government bank of some type at an average interest rate of 2.4% per month. Next came private banks, mentioned by 22% of the assemblers, at an interest rate of 3.6% per month; then came moneylenders who made 16% of the loans at a rate of 4.3% per month. Friends and relatives supplied the remaining loans.

Thus, while over 80% of all rice assemblers make loans to farmers, only 66% seek credit for their own business. This indicates that about 14% of the rice assemblers utilize only their own resources for working capital and farm credit. On the other hand, those assemblers who do seek credit most frequently turn to government banks, where credit rates are lower. Still, 16% must pay the high interest rates of moneylenders.

Transportation

As in nearly all areas in the Northeast, farm-to-market transportation is primitive. Frequently, trucks cannot reach the farms. Only 6% of assemblers in the São Francisco area (excluding major assembly centers) receive most of their rice by truck. Table 9.30 illustrates that transportation by truck is much more common in Codó.

Table 9.30 Percent of Assemblers Reporting Dominant Means of Rice Transportation--Northeast Brazil

Means	São Francisco major convergence centers (%)	São Francisco farm to small market towns (%)	Codó Maranhão (%)
Animal	0	23	18
Oxcarts, etc.	0	40	0
River transport (canoes)	61	31	0
Others (human head, etc.)	6	0	0
Total traditional means:	67%	94%	18%
Buyer's or seller's truck	0	4	30
Independent truckers	33	2	51
Total motorized means:	33%	6%	82%
Total traditional and motorized:	100%	100%	100%

SOURCE: SUDENE/MSU Assembler Survey (1967).

Summary

More than 3/4 of the rice consumed in the Recife market area is shipped in from southern Brazil. Within the Northeast, the lower São Francisco valley is the principal source of rice for Recife, although some is received from a new production area in Maranhão.

Farmers in the São Francisco area market about 80% of their rice output, retaining the balance for home consumption and seed. Sales per farm averaged 27 metric tons in 1966. Farmers sold an average of six lots during the year, with sales seasonally concentrated between August and December. Twenty percent sold all or part of their rice before harvest. Fifty-seven percent sold to buyers who deferred payment an average of one month after delivery.

The rice millers are the most important sales outlet for farmers, although assemblers are also important. The market seems reasonably competitive, with farmer and buyer contacts centered around the mill location.

There is excess rice milling capacity in the São Francisco area, with a trend towards fewer and larger mills operating a greater number of days during the year. Some mills provide custom milling services as a way of gaining volume.

Some reduction in rice marketing costs are being realized through a new vertically coordinated arrangement which links a Recife supermarket with a large rice mill in the São Francisco area. Through an aggressive retail pricing policy plus a lower cost procurement system, this system is underselling the more traditional rice marketing system by 10 to 15% at the retail store level.

Rice storage is concentrated at the mills, but forty-two percent of the farmers stored rice on their farms. Farm storage losses were 1 to 2% according to farmers' estimates. However, only 27% of these farmers said they used fumigants in the stored grain.

The Rural Marketing System for Manioc

Introduction

Manioc originated in Brazil and spread throughout tropical America, Asia and Africa. The root is the low-cost source of starch in the tropical areas. It is grown in almost all the states of Brazil, with Bahia, Rio Grande do Sul, Santa Catarina, São Paulo, Pernambuco, and Minas Gerais as the leading producers. The parts of the plant above ground, especially the leaves, contain a high percentage of proteins and Vitamin A, but are not commonly used for either human or livestock consumption. The milk of the manioc root contains toxic hydrocyanic acid, which must be eliminated by heating, cooking, baking and/or exposure to the sun before human consumption is possible.

Many products and by-products can be processed from the manioc root. However, the main product is manioc flour, which is used extensively for food in Brazil. It is also used by the petroleum industry in the drilling process.

Manioc is one of the staples in the Brazilian diet. The average annual per capita consumption for all of Brazil in 1960

was 124.6 kilograms. Due to its low price and high carbohydrate content, manioc flour makes up an important part of the diets of the low-income urban and rural population. The average rural per capita consumption in 1960 was 199.6 kilograms for all of Brazil and was no doubt significantly higher in the Northeast.

The Getulio Vargas Foundation has estimated that the demand and supply of manioc will increase by about 60% between 1965 and 1975 (Table 9.31). If recent trends continue, most of the additional output will be accomplished by increasing the area planted rather than through higher yields on the existing land in production. Between 1960 and 1965, manioc yields for all of Brazil increased by only about 9%.

Table 9.31 Estimates of Manioc Supply and Demand in Brazil (in 1000 tons)

Year	Real Demand	Internal Supply	Real Surplus
1965	20,870	20,030	160
1975	33,070	33,780	710

SOURCE: Fundação Getulio Vargas, *Supply and Demand Projections of Farm Products for Brazil*, Vol. 1, pp. 153-155.

Manioc is produced everywhere in Brazil, but the largest producing areas are those which have the greatest concentration of population. Table 9.32 shows that the Center-South is the largest manioc producing region, followed closely by the Northeast. That table also indicates that Northeast output between 1960 and 1965 did not keep pace with the rest of Brazil.

Manioc yields vary from 10 to 50 tons of roots per hectare. Most common are yields of 10 to 15 tons per hectare. The average yield in Bahia is larger than in the other states. In 1965, the average yield in Bahia was 15.6 tons per hectare, compared to 10.1 for Pernambuco and 11.7 for Rio Grande do Sul.

SUNAB estimated manioc production in Pernambuco for 1966 to be 105,380 tons, compared to total consumption of 127,709 tons. This leaves a state deficit of over 22,000 tons. Most of this is imported by truck from surrounding states in the Northeast, but

Table 9.32 Manioc Production by Region in Brazil

Region	1960 tons	%	1965 tons	%	Percent Increase 1960-65
North	811,984	4.6	1,317,675	5.3	62
Northeast	7,631,494	43.3	9,559,064	38.2	25
Center-South	9,169,735	52.1	14,115,858	56.5	54
Brazil	17,613,213	100.0	24,992,579	100.0	42

SOURCE: IBGE - Statistical Annuals of Brazil: 1963, p. 66; and 1966, p. 106.

some 3,000 tons did enter the port of Recife from the Center-South of Brazil in 1966.

In summary, it seems clear that manioc will remain an important source of food in Brazil for some time, especially in the lower income areas. However, yields are low and there has been little improvement in recent years. While the Northeast as a whole is self-sufficient in manioc production, the state of Pernambuco is a net importer, mostly from neighboring states.

Description and Evaluation of the Rural Assembly System

Market Structure

The manioc supply area for Recife is concentrated in the humid coastal zone and in the semi-arid Agreste to the west of the city. However, some manioc is produced in most parts of the state.

One might characterize manioc production and marketing as one step removed from subsistence farming and barter exchange. The farmer generally has only a very small piece of land. He will produce manioc along with a few other crops for family consumption. The manioc is harvested periodically through the year and sold to a local miller or processed by the farmer in his own or in a neighbor's crude mill for which payment is usually made in kind. The surplus flour is then sold in a local *feira* in order to finance the purchase of food and non-food items for the manioc farmer and his family.

The sale in the local *feira* may be to any one of several different kinds of buyers who specialize in manioc flour (*farinha*).

Most frequently, those buyers will transport the flour in their own vehicles or pay a trucker to move the product to Recife for direct sales to retailers. This process goes on year round, but production in Pernambuco seems to be heaviest from September through November.

This section will focus first on some detailed description of the market structure for manioc by reviewing marketing methods of farmers, by discussing the different types of assemblers and their marketing procedures, and by examining the assemblers' sales link to the Recife market. The remainder of the discussion on manioc will be directed toward an examination of the performance of the marketing system with respect to competitive behavior, prices, margins, and the various functions performed in the system.

Farmer Marketing Activities

Table 9.33 shows that the average quantity of manioc flour produced per farm in 1966 was slightly greater than in 1965. It also indicates that 85 to 90% of the production was sold in both years. Home consumption and/or losses were slightly higher in 1965 than in 1966.

Table 9.33 Average Quantity of *Farinha* Produced and Sold by Farmers in the Sample, 1965-66

	1965	1966
Quantity produced (in kgs.)	6,717	7,540
Quantity sold (in kgs.)	5,799	6,883
Percent sold	86	91

SOURCE: SUDENE/MSU Survey (1967).

Total sales of *farinha* averaged NCr$1,211 during 1966. However, the existence of a few large operators can make the average a poor indicator of the actual sales. A better indicator in this case is the fact that 1/2 of manioc producers had *farinha* sales of less than NCr$200 during 1966. Total gross farm sales per manioc producer were NCr$1,505 in 1966. Sales of *farinha* accounted for 81% of total farm income. Such a high percentage indicates a high degree of farmer specialization in manioc production.

Farmers reported an average of 22 different sales transactions per year with some making as many as 98 different sales transactions. However, over 50% of the farmers reported selling less than 12 times in 1966 (Table 9.34). Sales were made throughout the year, but the most intensive marketing period for Pernambuco producers seems to be September through November. The least intensive marketing period stretches from April through June.

Table 9.34 Number, Timing, and Size of Farmer *Farinha* Sales, 1966

	Range	Average	Median
Number of sales per year	0-98	22	12
Most intensive sales period	N.A.	N.A.	Sept-Oct-Nov
Least intensive sales period	N.A.	N.A.	Apr-May-June
Size of first sales (kgs.)	0-28,500	2383	700
Size of second sale (kgs.)	0-15,000	1052	300

SOURCE: SUDENE/MSU Survey (1967).

Farmers were asked to indicate the size of their first and second manioc flour sales transaction in 1966. The results are reported in Table 9.34. Once again the median value in both cases was significantly lower than the average. Nevertheless, using either the mean or median size of transaction as an indicator, it is clear that each individual farmer concentrates the bulk of his harvesting and sales in one period and then makes smaller sales through the rest of the year. Moreover, it is clear that the amount of *farinha* sold at one time by any one farmer is very small, usually small enough to be carried to market on one or two horses.

Almost always, the farmer takes the product to a local *feira* or sometimes to a public market in a convergence center where it is sold to a variety of buyers. Table 9.35 indicates that a large number of transactions (31%) were made directly with *feira* operators. Selling to the *feira* operator may in some cases reflect a type of bartering in which the manioc producer sells or barters his *farinha* to the *feira* operator and buys from this same individual some of the food items needed for his family. It is likely, however, that the percentage of sales to *feira* operators is overstated

due to some farmers interpreting the question to mean sales at the *feira* whether or not they were to one of the stall operators there. About 21% of the farm sales were made to trucker-buyers and about 16% to local buyers. The latter category would probably include those sales of the raw manioc root to local specialized millers. The balance of the sales were made to landlords, consumers, or to various types of buyers who make purchases in rural *feiras* and convergence markets such as Vitoria do Santo Antão.

Table 9.35 Percentage Distribution of *Farinha* Sales by Producers for Month of Largest Sales, 1966

Type of buyer	Percent sales in largest sale month
Consumer	9.3
Landowner	2.7
Local buyer	16.0
Warehouse buyer	6.0
Big Recife buyer	3.3
Other big buyer	2.0
Out-of-town trucker-buyer	20.7
Feira operator	30.7
Other and don't know	9.3
TOTAL	100.0

SOURCE: SUDENE/MSU Farmer Survey (1967).

Assembler Characteristics and Channel Maps

The foregoing discussion of farmer marketing channels suggested that most sales are made to three distinct types of buyers. The assembler survey also indicated that such a three-way classification could be used to characterize manioc assemblers. In the first group one finds the miller-buyers. These are individuals who own a mill--which may be a hand powered mill owned by a farmer and used only occasionally or it may be a commercial mill with electric or gasoline powered equipment. The second group is the largest and includes local merchants, *feira* buyers, public market buyers, and a few local fixed assemblers. The third group is made up of itinerant buyers

who occasionally make farm purchases but most frequently do their buying in rural *feiras* or at public markets in convergence centers.

There are approximately 436 manioc assemblers in the *municipio* areas chosen as the universe of the sample. These assemblers are classified in Table 9.36. The extremely large number of assemblers dealing in small volumes gives an indication of the atomistic nature of manioc milling and assembly.

Table 9.36 Number and Size of Manioc Assembly and Milling Firms

Type	Estimated number of firms in population	Range in annual volume (metric tons of flour)
Millers paid in kind[a]	195	.5-3.0
Miller-buyers	90	1-120
Small assemblers	70	3-75
Public market buyers	27	50-600
Trucker-buyers	42	20-150
Large itinerant assemblers	12	100-1,200
TOTAL	436	

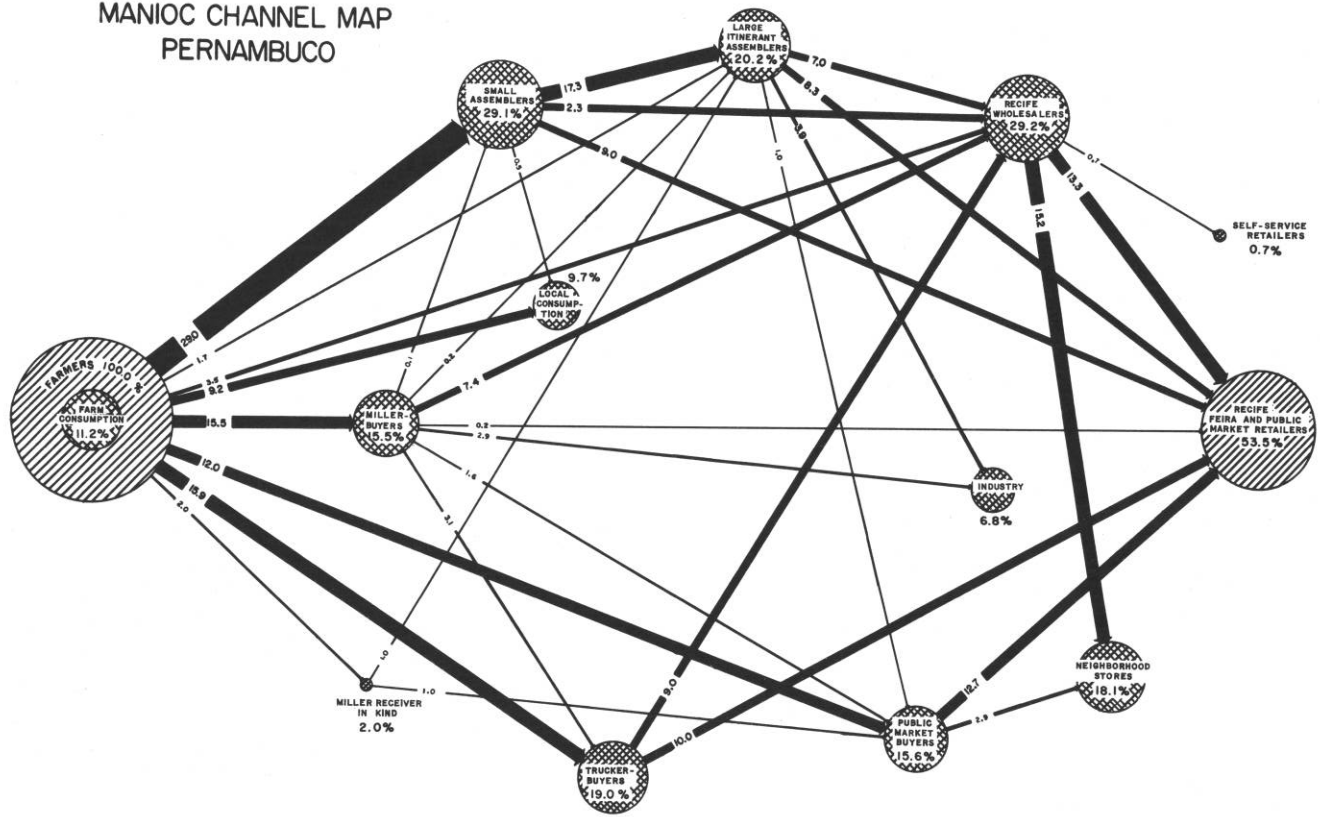
[a]Only millers that charge a commission in flour for use of mill are included, and the volume listed pertains to flour received in this manner. Those who mill only their own manioc are not assemblers.

SOURCE: SUDENE/MSU Assembler Survey and case studies (1967).

The following channel map shows the relative importance of the different types of manioc assemblers and their most important Recife sales outlets (Figure 9.5). This map is based on data collected in the random survey among assemblers in three important manioc producing *municipios* near Recife. Due to the complexity and diversity of the marketing channel, this map should only be regarded as a good approximation of the actual system. Nevertheless, the data from which the map was constructed are the most reliable collected to date. A number of general conclusions about the operation of the manioc marketing system are clear and reliable.

The map shows that no single channel from farmer to consumer is dominant. The volume is divided among several different channel combinations.

FIGURE 9.5
MANIOC CHANNEL MAP
PERNAMBUCO



000 PERCENT PRODUCTION

The assembler survey data verifies the farm sales data discussed earlier, showing that the most important farm level buyers of manioc flour are local assemblers. It is estimated that the buyers in this group purchase about 29% of the total production. The second most important type of rural buyers are truck owners and itinerant buyers who rent transport space (19%). These are followed by miller-buyers (15.5%), public market buyers (12.0%), and Recife wholesalers buying direct from farmers (5.5%).

The map shows that relatively little trading goes on between rural assemblers. The product frequently flows directly from the farm level buyer to a Recife wholesaler or retailer. This is probably due to the closeness of the manioc supply area to the large consumer market in Recife. Table 9.37 shows the percentage of manioc flour flowing through two, three and four assembler levels. The average number of handlers is relatively low for a developing area (2.65). But given the level of margins, marketing costs are still relatively high in the light of services performed.

Table 9.37 Percent of Total Manioc Flour Moving through Various Numbers of Market Transactions between Producers and Retailers

Number of Transactions	% of Flow in Pernambuco
Two	46.6
Three	42.0
Four	11.4
TOTAL	100.0
Average Number of Transactions	2.65

SOURCE: SUDENE/MSU Assembler Survey (1967).

Manioc assemblers vary widely in their characteristics (Table 9.38). The volume of manioc flour purchased ranged from 1 to 200 metric tons, with a mean of 35.4 and a median of 13. This indicates that most assemblers handle very small amounts. The average total value of those purchases was NCr$7,330. Those purchases are made from an average of 36 farmers during the year. However, the total

purchases from one farmer could have been made at several different times during the year, resulting in the extremely small transaction sizes noted in the farmer marketing section. It is significant that 42% of the assemblers interviewed were part-time manioc buyers with farming as their major occupation. The remaining 58% listed their major occupations as millers, assemblers, traders or transporters. The majority of assemblers (59.4%) do not employ full-time workers in their businesses, but most do use a considerable amount of family and part-time labor. The average weekly wage bill for manioc assemblers was NCr$61.00.

Table 9.38 Structural Characteristics of Manioc Assembly Firms, 1966

Characteristics	Range	Median	Average
Metric tons manioc flour traded	1-200	13	35.4
Total value of annual purchases (NCr$)	N.A.	N.A.	7,330.0
Number of suppliers	1-180	18	36.0
% with major occupation farmer	N.A.	N.A.	47.3
% with major occupation miller or assembler	N.A.	N.A.	52.7
Number of full-time employees	0-5	1	1.7
Weekly wage bill (NCr$)	0-200	51	61.0

SOURCE: SUDENE/MSU Survey (1967).

Manioc Flour Mills

Milling is a very labor-intensive operation. Women peel the tubers while other workers operate the mill which grinds and presses the manioc, removing the toxic juices. The remaining portion is sifted and then toasted in open ovens heated by firewood while being constantly turned to prevent burning. It is then taken from the oven and bagged. It is estimated that about 90% of all the mills in the area surveyed were owned by farmers who do not purchase additional manioc for milling. However, most of these farmers do permit other producers to use their mills if a certain percentage of the flour is paid as rent for the use of the equipment. In many cases the mill owners buy the rest of the farmer's flour and sell it when he markets his. Thus, many farmer-millers become small, part-time

assemblers as well. Moreover, a few of these miller-farmers purchase tubers to mill and sell as manioc flour. The final category of miller-buyers are those who own motor-driven mills and operate them as their major occupation. There are relatively few of these, but their average volume is usually large.

The daily capacity of the mills surveyed ranges from 100 to 2,000 kgs. of flour, while averaging 551 kgs. The average value of these mills is estimated at NCr$1,625. While the cost of manioc milling varied from 5 to 18 centavos (NCr$) per kg. of flour, both the average and median costs were about 8 centavos (NCr$) per kg.

Small Assemblers

Grouped here are a wide variety of flour buyers who usually make their purchases direct from the farmer in a local *feira* retail outlet or in a public market at a convergence center. It includes retail store owners who sell their goods on credit to farmers and take *farinha* in payment or who purchase flour outright. Also included are specialized buyers who rent space in a public market such as Vitoria do Santo Antão, small rural fixed assemblers, and part-time farmer-assemblers. All assembler types in this group, except public market buyers, most frequently sell to other assemblers such as large itinerant buyers. Public market buyers are most likely to sell to Recife wholesalers or retailers.

Itinerant Assemblers

There are basically two types of assemblers within this group. The first are individuals who own trucks and travel from *feira* to *feira* and then to Recife transporting goods for a fee. Occasionally they may buy a few sacks of manioc flour to sell in another market. However, their major occupation is that of a transporter. The other type within this group are the large itinerant assemblers. These individuals may or may not own a truck. Those who do not have their own transportation rent space from the truckers mentioned above. These, however, are full-time buyers who may handle several truckloads of manioc flour a week. Nevertheless, their methods of operation and attitudes remain as traditional as other assemblers in the system.

Both types of itinerant assemblers mentioned above sell primarily to Recife wholesalers and retailers, often under a regular supply arrangement.

Competitive Behavior

A look at the structure of the manioc assembly market for Recife would suggest that the system is reasonably competitive. In the 13 *municipio* areas around Recife where manioc is intensively produced, there are an estimated 436 firms making purchases direct from farmers. None appear to be large enough to affect prices by their actions. Moreover, most of the transactions with farmers are made in rural *feiras* or convergence center markets with several buyers making purchases there on any given day; thus prices within a given market on a given day are governed by competition among buyers in that market and farmers selling there have ready access to the prevailing price. On the other hand, due to the absence of regular price information, price differentials between the various rural markets and Recife on any given day may be greater or smaller than the cost of transportation. This market maladjustment is reduced by the person-to-person flow of price information through assemblers dealing in several markets. This flow of price information is subject to all the distortions of such an informal communication media and may be purposely distorted in cases where it is to the economic advantage of the assembler-communicator.

It was noted earlier that manioc assemblers tend to be quite homogeneous in their personal characteristics, methods of operation, size of business, and attitudes. This homogeneity coupled with the atomistic market structure mentioned above has seemingly produced a competitive environment conducive to economic stagnation as opposed to dynamic growth and improvement. There are apparently no larger scale, lower cost, more innovative assemblers in the system who are creating a competitive force which might lead to lower margins, better handling, and improved marketing services. Sales arrangements seem to depend on habitual exchange between a farmer and his assembler. About 44% of the assemblers interviewed said they bought only from regular suppliers. When asked why they thought farmers continued to sell to them regularly, 37% mentioned that it was because they pay higher prices, 31% simply said they were "old customers" and 12% felt their giving regular credit was the main reason.

In spite of the fact that the manioc assembly market appears reasonably competitive, there is some evidence of market sharing and price collusion. There seems to be an attitude of "live and let live" among assemblers. There is a general recognition of their interdependence with other firms in the market and that ag-

gressive competition would only make it more difficult for all. Thus, nearly 65% of the assemblers agreed that "businessmen who pay more in order to buy more are not well regarded by others." But social sanctions and an attitude of live and let live are not the only factors which may limit competition. About 40% of the assemblers admitted that they had been invited to make a collusive price agreement with other assemblers. This certainly does not mean that 40% of the assemblers are colluding, but the prevalence of "offers" suggests that some arrangements are being made; otherwise such offers would not have been encouraged.

Table 9.39 indicates that propensities to exit from manioc marketing are great among small assemblers (millers, store owners and gatherers). It appears that many would turn to farming and other endeavors if the larger assemblers were to increase their volumes. It seems as though the smaller assemblers have contemplated their position and are looking for alternative employment. This suggests that a trend toward larger scale, vertically coordinated firms would not create undue social problems.

Table 9.39 Indications of Propensities to Exit

Attitude	Response	Predominant type of assembler responding in this manner
Willing to migrate to city	23.6%	Store owners and gatherers
Average salary needed to attract to city	NCr$244/mo.	
Prefer to invest outside manioc	66.7%	All types are equal
Feel their other businesses more important	72.2%	All but large itinerants and truckers

SOURCE: SUDENE/MSU Assembler Survey (1967).

Prices and Margins

It has been noted earlier in an examination of the market channel map for manioc flour that small and medium-sized assemblers in rural *feiras* and public markets are the most important buyers of *farinha* at the farm level. Table 9.40 shows the percentage of all reported sales transactions in the farmer survey which were

made with the different types of buyers. It also shows the average price paid by each. The average price paid by small and medium-sized assemblers is almost two centavos (NCr$) more per kilo than that paid by itinerants.

Table 9.40 Relative Importance of Different Types of Manioc Assemblers and Prices Paid by Each, 1966

Type of assembler	% of farmer transactions made with:	Average prices paid
Miller-buyers	8.8	19.8
Small & medium assemblers	61.3	20.2
Itinerant buyers	29.9	17.5
Totals and combined average	100.0	19.4

SOURCE: SUDENE/MSU Survey (1967).

In both rice and bean markets, itinerants represent a competitive lead edge in the system due to their ability to bypass certain intermediate handlers. It appears that traditional manioc flour assemblers, due to their geographical proximity to Recife, already have fairly direct sales connections with wholesalers and retailers in the city. Moreover, the itinerant manioc assemblers tend to operate much like their traditional counterpart assemblers. Most make small lot purchases in several different *feiras* and either use their own truck or rent space to transport the product to Recife.

Table 9.41 shows the range, median, and average price received by manioc farmers. These data suggest that in 1966 prices tended to be lowest during the months of April to July. The reader will recall that this was the period of least intensive sales by farmers in the sampled area. The low price suggests that supplies from other areas either in the Northeast or from the South were large enough during that period to depress Recife prices. Manioc flour prices were higher during the months of August to December and January to March. The average seasonal variation price between the months of lowest prices and the months of highest prices is relatively narrow (not more than 4 centavos per kilo, or about 20%).

Table 9.41 Farmer Sales Price for Manioc Flour, by Month, 1966

Month	Range new centavos/kg.	Median	Average new centavos/kg.
January	6-33	19.0	19.21
February	6-42	20.5	20.09
March	8-38	17.0	19.70
April	3-33	16.0	17.29
May	5-38	16.5	18.50
June	5-33	18.0	18.10
July	7-44	17.0	18.33
August	12-38	20.6	20.00
September	16-29	21.0	20.81
October	10-33	16.0	18.95
November	10-50	19.0	20.89
December	6-35	19.0	19.48

SOURCE: SUDENE/MSU Survey (1967).

An effort was made to determine the gross margin of manioc assemblers. Each respondent was asked how much mark-up (in NCr$ per unit of product) would be required for him to cover his costs and make a normal profit. The resulting average mark-up among all millers and assemblers was 6.4 new centavos per kilo of manioc flour. The reader should note that this average does include miller-buyers who process the product in addition to performing the assembly function. Their costs and margins would tend to raise the average. If one adds this average fixed margin to the average farm price for 1966, a base assembler sales price of 25.8 new centavos per kilo is the result. Using this base, the gross percent margin for manioc assemblers would be 24.8%. An alternative base price would be the average highest price received by assemblers in 1966. That average price of 24.9 new centavos per kilogram would produce a gross percent margin of 25.7%.

Using either base price, the gross percentage mark-up seems fairly high in relation to the margins of other product assemblers. Part of this may be due to an over-estimate of the margin required by manioc assemblers to cover costs and yield an adequate profit. But there is no reason to believe that the response bias among

manioc assemblers should have been greater than for other commodity assemblers. This, coupled with the evidence that gross retail and wholesale margins on manioc flour are relatively higher than for other products, suggests that manioc assemblers actually do obtain higher margins under present conditions than do other commodity assemblers.

Market Information

In Chapter 7 it was noted that neither manioc farmers nor assemblers indicated a high degree of usage of the printed media or television, although assemblers showed significantly greater exposure than farmers. On the other hand, the majority of both assemblers and farmers do listen to the radio for at least one hour a day. This suggests that radio holds considerable promise as a medium for reaching both farmers and assemblers with market information.

At the present time, however, none of the mass media are a significant source of market information for farmers and assemblers (Table 9.42). Virtually all market information in the manioc assembly system flows by word-of-mouth. Farmers depend

Table 9.42 Major Sources of Market Information for Manioc Farmers and Assemblers, 1967[a]

Sources	Farmer price info. (%)	Assembler price info. (%)	Market condition info. (%)
Assemblers	29.3	52.7	37.4
Market observation	60.7	26.0	43.7
Brokers/wholesale agents	0.0	19.3	18.9
Relatives/neighbors	9.4	0.0	0.0
Radio	0.0	1.2	0.0
Other	.6	.8	0.0
TOTAL	100.0	100.0	100.0

[a]Farmers were asked to give their source of price information and assemblers were asked first, the source of their price information and second, the source of their market condition information.

SOURCE: SUDENE/MSU Surveys (1967).

almost completely upon the local assembly market for their price information. It comes either directly from assemblers or by personal observation of prevailing prices in a local market, or second-hand by way of a relative or neighbor who has used those same sources. Assemblers depend on personal observation in Recife or on the word of other assemblers who have observed that market more recently. There is also some dependence on traveling brokers or agents of Recife wholesalers.

It is clear that market information among farmers and assemblers of manioc flows by word-of-mouth from the Recife wholesale-retail markets to assemblers in rural convergence markets and on to rural *feiras*, where it is reflected in market conditions and passed on to farmers by observation and word-of-mouth. Under this system, farmers could be at a disadvantage, since they have to depend on their buyers for price information. This may be a problem for the 54% of farmers who reported obtaining price information only from the assemblers who bought their flour.

Assemblers were asked two additional questions in an effort to learn something about the effect of this kind of market information system on assembler market power and performance. Almost 99% of the manioc assemblers agreed that inadequate market information was an important factor limiting the growth of their business. On the other hand, only 17% agreed that assemblers in general are in a stronger bargaining position than their farmer-suppliers due to better market information.

Inspection and Quality Control

At the time of sale, buyers usually probe each sack of *farinha* brought in by farmers to determine its quality. After the buyer has made his subjective evaluation of the flour's quality, he will make his price offer accordingly.

Manioc producers generally accept the weights given to them by buyers. Sixty-three percent of the farmers in the survey believe that their buyers give them honest weights. On the other hand, 31% of the manioc producers believe the buyers are cheating them on weight. One of the best ways for producers to prevent being cheated on weight is to own their own scale. Among manioc producers, 39% own a scale.

There is considerable variation in the quality of manioc flour. As a result, retail price differentials related to product quality are significant. The highest quality flour at a rural *feira* might sell for 10 to 20% more than the cheapest quality. The level

of quality of manioc flour is a function of texture, coarseness of grain, humidity and freshness. It is said that the best flour is still "warm."

In general, rural assemblers recognize that their buyers (urban *feirantes* and wholesalers) feel quality is important (as indicated in Table 9.43), but few assemblers carry this recognition into their own operations. Thus, price differentials and quality signals seldom reach farmers.

Table 9.43 Opinions of Manioc Assemblers on Quality Awareness and Information

Attitude	% of Assemblers
Feels buyer pays more attention to quality than price	86.8
Feels buyer seeks best quality from several suppliers	90.3
Feels buyer expects constant quality	49.3
Sales price varies with quality	76.1
Other assemblers buy good quality	43.1
Other assemblers inform producers on quality	55.0

SOURCE: SUDENE/MSU Assembler Survey (1967).

Storage

Storage of manioc flour is seldom carried out on the farms. When it is stored, the usual storage unit is a wooden box that does a very poor job of preserving the flour. The most common method of storing manioc is to leave the roots in the ground rather than harvesting them. The producer can store the manioc in this way until he wishes to make flour. At that time it is made into flour and must be sold within a few weeks or it will deteriorate in quality.

Due primarily to the risk of product spoilage under present storage technology, there is relatively little storage of manioc flour in the marketing system. This is especially true of long-run storage. Only 3.5% of the interviewed assemblers reported storing flour for more than 30 days in 1966. The most frequently mentioned types of storage facilities were earth floor warehouses for sacks (22%), concrete floor warehouses for sacks (16%), and

public warehouses of different types (12%). However, 37% of the assemblers had no storage space at all. It appears that manioc flour storage is primarily of a short-run nature, with a significant percentage of assemblers not storing at all.

Credit

It was noted earlier that manioc farmers obtain formal production credit primarily from government banks. However, it appears that manioc assemblers are also an important source of credit for some farmers. Almost 73% of the manioc assemblers in the survey said they sometimes advance credit to farmers. Evidence suggests that the smaller scale local buyers are the main source of this type of farm credit. The average assembler advanced credit to an average of eight farmers in small quantities. The average total credit volume granted to those farmers was NCr$651, yielding an average of NCr$81 per farmer. Normally these loans are granted during the months of January through June for short periods ranging from 4 to 20 weeks. The reader will recall that this is the period when manioc prices and marketings in the survey area are low. This suggests that the small amount of credit granted by assemblers is used for farm consumption expenditures in the non-marketing period. Assemblers indicated that all of those loans were repaid by farmers in manioc flour.

About 87% of all assemblers in the survey had borrowed during 1966. Thirty-seven percent had borrowed from moneylenders at interest rates ranging most frequently from 4 to 6% per month. The next most important sources of assembler credit were friends and relatives (24.3%), who ordinarily charged no interest. Only 5.6% of all assemblers had borrowed either from government or private banks at monthly interest rates of 1.2 to 2.5%.

Thus, while manioc assemblers are an important source of small amounts of credit to their farmer suppliers, they in turn depend largely on moneylenders at high interest rates or friends and relatives at no interest charges. When assemblers were asked why they did not borrow more, 21% said it was because they had no source of additional credit. About 89% of all assemblers said that the absence of adequate credit was an important factor limiting business expansion. This suggests that the absence of adequate, reasonably priced credit is a factor which may be importantly retarding improvements in the manioc marketing system.

Transportation

The major form of transportation in the manioc assembly system appears to be by animal-back. Seventy-five percent of the assemblers said that the majority of their product was transported to them in that way. On the other hand, nearly 24% gave trucks as the major type of transportation.

Some idea of the nature of the road system in manioc assembly areas is given by the following percentages of farmers with businesses on the different types of roads.

Paved	8.9%
Gravel or Graded Dirt	7.3%
Clay	40.7%
Oxcart	41.5%
Other	1.6%

Thus, travel by truck is made difficult if not impossible for a large percentage of manioc assemblers by the type of road passing by the firm. Even so, given the fact that manioc farmers tend to sell small quantities at several different times during the year, it does not seem likely that new or improved farm-to-market roads would spur a change in rural manioc transportation. But poor and inadequate roads between rural towns, convergence markets and Recife may be adding costs and distortions to the flow of manioc from assemblers to consumers. Evidence of this possibility from the present study is not sufficient to warrant any firm conclusion.

Summary

Manioc flour is a staple food in the diet of the Northeasterner. It is especially important in the diet of the poor because of its relatively low price and high carbohydrate content. Manioc farmers generally have small farms, are highly specialized, are poorly capitalized, and have low incomes. Farmers sell their manioc throughout the year in small lots, with major marketings in September through November. Frequently, farmers obtain loans from their assembler-buyers in order to feed their families during non-harvest periods.

Most of the manioc entering the marketing system is milled by the farmers themselves using crude, manually-operated equipment. The rural *feira* is the most important place for meetings between farmers and buyers. There, producers sell to local small assemblers,

trucker-buyers, large itinerant buyers, *feira* retailers, and big city wholesalers. A few commercial millers buy manioc roots, process them and sell flour.

Manioc assembly appears to be reasonably competitive, with large numbers of relatively small-scale firms. There is no indication that an innovative lead edge exists which might, through competition, force improvements in the manioc assembly system. Estimated average gross margins of about 25% tend to reflect the costs of the highly traditional marketing system. However, the lack of independent market information for both farmers and assemblers does tend to distort the marketing system and leave farmers in a poor bargaining position relative to assemblers, who are frequently dependent on their buyers for market information.

Manioc assemblers hold an important position in the rural assembly system with respect to the marketing functions of quality specification and control, storage, and financing. The research indicates that assemblers seem to be aware of the quality demands of their buyers but are somehow unable or unwilling to effectively transmit those signals to farmers. This is probably due to the fact that assembler purchases are made in small lots from large numbers of independent and poorly educated farmers who find it difficult to comprehend the reasons for or methods of quality control. To some extent, farmers ration the supply of manioc in the system by regulating the amount of manioc harvested, milled and marketed through the year. However, once the root is processed into flour, the product is moved through the marketing system as quickly as possible in order to maintain its quality. But any storage which does take place is normally performed by assemblers and does not extend much beyond 30 days. Assemblers are an important source of credit for small manioc farmers. Assemblers in turn must seek credit for business operations and farm loans. The major credit source is moneylenders and interest charges are usually 4.0 to 6.0% per month. This suggests that farmers must pay dearly for the second-hand credit obtained through their assemblers. The apparent lack of reasonably priced bank credit for manioc assemblers may be due to their poor financial conditions and lack of collateral to qualify for low-cost bank loans.

The Rural Marketing System for Cotton

Introduction

Cotton is important to the Brazilian economy not only because of its position in the domestic economy, but also as an important source of foreign exchange. Brazil ranks fifth (1962) among world nations as an exporter of cotton.

Although fiber is the most widely recognized product of cotton culture, there are several other important by-products, most of which are associated with the cotton seed. These by-products include edible oil, cottonseed meal for animal feed, extraction residues for soap manufacturing, and cottonseed hulls for animal feed and industrial uses.

Two different types of cotton are produced in Brazil: herbaceous and arvaceous. The first is an annual cotton which has somewhat shorter fiber length and is grown primarily in the Center-South of Brazil. The second is a tree cotton which is perennial. The fiber produced is fairly long and in general is of higher quality than annual varieties. The major producing area for tree cotton in Brazil is the Northeast. In the following discussion, the production figures will combine the two types of cotton.

In 1965, total cotton production for Brazil was about 2 million metric tons. The Center-South produced about 57% of that total and the Northeast about 42%. The Getulio Vargas Foundation has estimated that between 1965 and 1975 Brazilian cotton output will nearly double (87%) and that the exportable surplus will increase fourfold to 1/3 of total output in 1975 (Table 9.44).

Table 9.44 Cotton Supply and Demand Estimates in Brazil (in 1000 tons)

Year	Actual demand	Internal supply	Surplus
1965	1820	2120	300
1975	2660	3960	1300

SOURCE: Getulio Vargas Foundation, *Supply and Demand Projection of Agricultural Products for Brazil*, Vol. 1, pp. 153-54.

If recent trends continue, it seems likely that most of that increased production will come from the Center-South, where rapid improvements are already being made in production methods. Northeastern cotton producers remain very traditional, with little indication of yield improvements.

The main producing states in the Northeast are Ceará, Rio Grande do Norte, Paraiba and Pernambuco. São Paulo is the most important producing state in the South (Table 9.45).

Table 9.45 Cotton Production and Yields for Selected States, Brazil, 1960-65

States	Production (1000 Metric Tons)			Yields (Kg/Hectare)		
	1960	1965	% Change 1960-65	1960	1965	% Change 1960-65
Ceará	175	271	55.9	406	309	-24
R. G. do Norte	120	120	0.4	308	245	-20
Paraiba	168	160	-4.8	400	379	-5
Pernambuco	101	95	-6.2	291	287	-1
São Paulo	641	626	-2.4	1003	851	-15

SOURCE: IBGE - Statistical Annuals of Brazil: 1963, p. 61; and 1966, p. 101.

Average yields in São Paulo are substantially higher than in the Northeastern states. Yields went down in all the states between 1960 and 1965, probably due to weather factors.

In summary, cotton production holds an important place in the national and regional economies. It appears that cotton will continue to be an important agricultural crop with a growing surplus for export. The trends indicate that, barring dramatic changes in the Northeast, the Center-South will grow in relative importance due to rapid improvements in production methods.

Description and Evaluation of the Rural Assembly System

Market Structure

Cotton production in the Northeast is concentrated primarily in the Sertão area of the states of Ceará, Paraiba, Pernambuco and Rio Grande do Norte. Production is widely scattered in small fields interspersed between natural pasture and idle land. There are few

areas of intensive production. As a result, the assembly system must cover large geographic areas, while cotton gins are widely scattered. Several intermediaries are often required in the marketing system to direct the flow of seed cotton from the farmer to a distant gin and the fiber from there to a textile manufacturer or exporter. In most cases, farmers sell to some kind of intermediate assembler who in turn sells the seed cotton to ginners. Quite frequently these intermediate buyers act as agents to dole out credit to farmers during the production season. This credit is supplied by independent ginners or by SANBRA, the corporation which gins a high proportion of the cotton in the Northeast. At harvest time the farmer is expected to sell his cotton to the assembler who provided him with credit during the growing season.

Much of the Northeast's cotton output is consumed by textile mills in Fortaleza and Recife. A substantial amount is also exported.

The following discussion summarizes information from survey data from farmers and assemblers in Pernambuco and Paraiba. Farmer marketing activities will be described, followed by some description of the different kinds of assemblers and their buying and selling arrangements. Finally, the marketing system will be examined with respect to such factors as competitive behavior, prices, margins, and performance of several key marketing functions.

Farmer Marketing Activities

In 1966 cotton farmers in the sample area produced an average of 3200 kgs. of seed cotton per farm, of which 99.2% was sold (Table 9.46). The remaining .8% was used for home consumption or

Table 9.46 Average Quantity of Cotton Harvested and Sold by Farmers, 1965-1966

	1965	1966
Quantity harvested (in kgs.)	3360	3200
Quantity sold (in kgs.)	3316	3174
Percent sold	98.7	99.2

SOURCE: SUDENE/MSU Survey (1967).

lost in the marketing process. Average output in 1966 was slightly less than in 1965. A very large percentage of the tree cotton in the Sertão is harvested during August through November. Table 9.47 shows that most farmers chose to sell all their production at one time and none made more than five different transactions. Even so, the typical transaction between a farmer and his buyer involves a relatively small amount of cotton. In the majority of cases, the sale would involve much less than a truckload of cotton. Thus, assemblers usually collect from more than one farmer in order to make up a load.

Table 9.47 Number, Timing and Size of Farmer Cotton Sales, 1966

	Range	Average	Median
Number of sales per year	0-5	1.43	1
Most intensive marketing period			Aug., Sept. Oct., Nov.
Least intensive marketing period			Feb., March April
Size of first sale (kgs.)	0-60,000	3014	1700
Size of second sale (kgs.-- for those selling more than once)	0-30,000	2780	1000
Total value of cotton sales (NCr$)	0-13,300	982.80	450.00

SOURCE: SUDENE/MSU Survey (1967).

Table 9.48 shows that the most important sales outlet for cotton farmers is to local warehouse owners or to ginners. For the first and largest sale, 34.5% of the farmers sold to that type of buyer. Local buyers with trucks are the second most important assembler-buyer, followed by out-of-town truckers, landowners (who eventually sell to one of the above-mentioned assemblers) and others. A similar ranking exists for the second and third transactions for those farmers who sold more than once. An indeterminate but substantial percentage (at least 65.5%) of the cotton goes through at least one assembler before reaching the ginner.

Table 9.48 Percentage Distribution of Cotton Sales by Producers for Four Transactions, 1966

Type of Buyer	1st Sale	2nd Sale	3rd Sale	4th Sale
Landowner	9.1	1.2		
Local buyer (with truck)	29.7	10.3	3.6	
Warehouse owner or ginner	34.5	13.3	4.2	1.2
Big buyer in other capitals	1.8			
Out-of-town buyers (with trucks)	12.1	3.0	1.2	
Others	6.7	1.2	0.6	0.6
No transaction	6.1	70.9	89.7	98.2
Total	100.0	99.9	99.3	100.0

SOURCE: SUDENE/MSU Farmer Survey (1967).

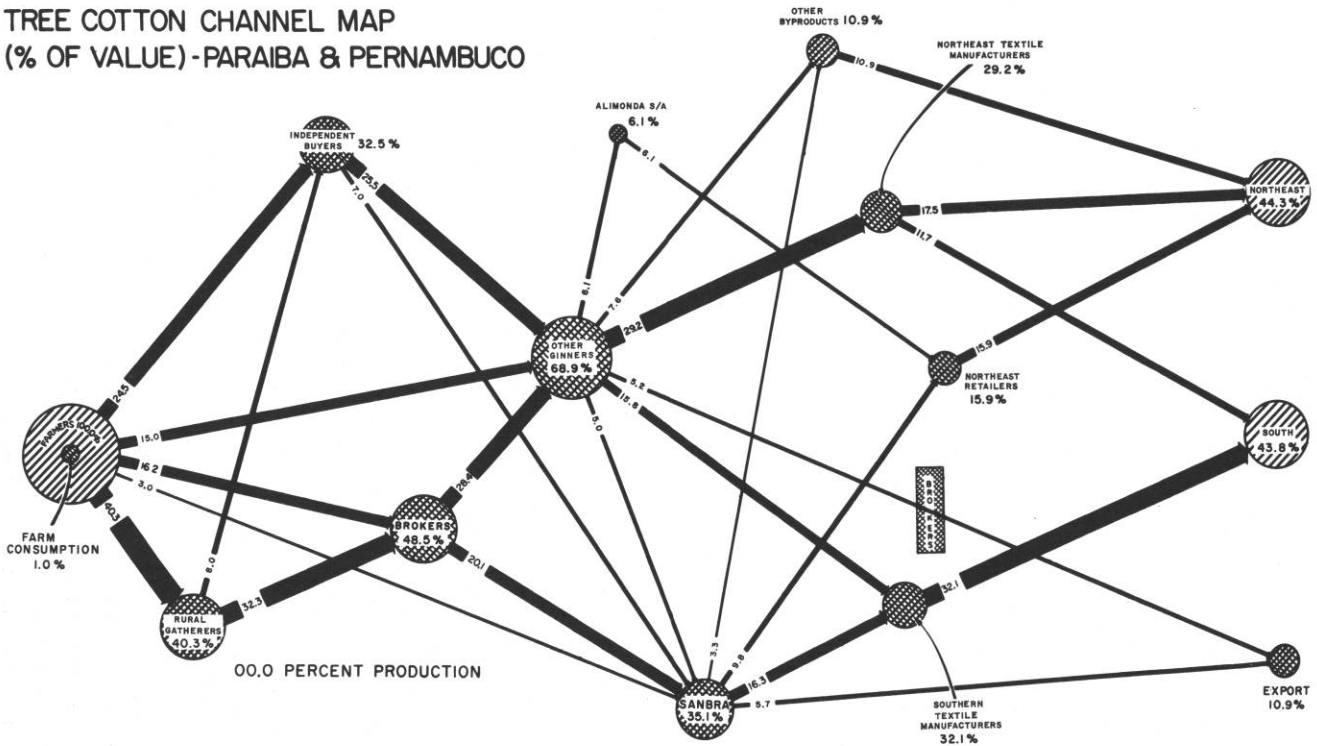
Assembler Characteristics

In the 14-*municipio* area in Paraiba and Pernambuco chosen for the present study, it is estimated that there are 20 cotton gins. Eighteen of those are large-scale ginners who maintain direct sales contacts with textile manufacturers and foreign buyers. The other two are smaller scale firms who, due to low volume, usually sell through a broker. Also in that area there are an estimated 185 independent buyers, 210 commissioned brokers, 95 rural gatherers and perhaps 50 independent truckers.

Figure 9.6 presents a graphic picture of the interactions between these different buyers and their farm suppliers. The map also traces the flow of cotton and its by-products through the marketing system to the consumer. The circles on the map indicate the type of marketing firm and vary in size according to volume handled by that type of marketing institution. The arrowed lines on the map indicate the flow of cotton or its by-products and are also proportioned in width according to the percentage of total production moving along each channel. The figures along each line give those estimated percentages. These channel maps were based on the results of the farmer, assembler, and industrial surveys as well as on case studies and personal observation in the cotton marketing system of the sample area. Since there is little secondary

FIGURE 9.6

TREE COTTON CHANNEL MAP
(% OF VALUE) - PARAIBA & PERNAMBUCO



data which could be used to verify the estimates flowing from the survey research, the channel map should be regarded as an approximation of reality. Nevertheless, the map is useful in studying and evaluating the marketing system for tree cotton in Pernambuco and Paraiba.

The most important type of cotton buyers at the farm level are what have been called rural gatherers. This may include local farmers, who also buy and sell unginned cotton; it may include local full-time assemblers as well as representatives of gin owners. Small volume purchases are a common characteristic of these cotton buyers, as is the practice of selling virtually all of the cotton purchased to some other type of assembler who in turn sells to ginners. A large amount of farm credit flows back through this same channel from ginners to producers.

Independent buyers are the next most important rural cotton buyer. These are assemblers who purchase on their own account and sell for the highest price to independent ginners and occasionally to SANBRA. These buyers tend to purchase in larger lots than rural gatherers and usually have a truck of their own or hire truck transportation.

The third most important type of cotton buyer is the broker. This individual does not take personal ownership of the cotton, but rather acts as the agent of SANBRA and other ginners. As noted above, he also is a major buyer from rural gatherers. Finally, an estimated 18% of the cotton in the survey area flows directly to ginners (15% to other ginners and 3% to SANBRA gins).

After processing, most of the by-products (i.e., oil and meal) are sold for use in the Northeast. By-products account for about 17% of the total value of cotton products moving on from the ginners. The remaining 83% is cotton fiber, which moves to textile mills and to export outlets (Figure 9.6).

The survey data indicate that about 35% of the cotton fiber was being manufactured into cloth in Northeast textile mills (29.2% as a percent of 83%). This estimate differs only slightly from estimates presented in an earlier study by the Bank of the Northeast.[6] Using 1962 data, this group estimated that 37.5% of the cotton fiber grown in the Northeast was also manufactured into cloth within the region; 45% went to mills in southern Brazil; and 17% was exported. The differences between the MSU/SUDENE estimates

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[6]Banco do Nordeste do Brasil and SUDENE, *Mercado e Commercialização do Algodão do Nordeste* (Fortaleza, 1964).

and those by the Bank of the Northeast could be due to the five-year interval between time periods observed and the difference in geographic coverage. The MSU/SUDENE survey focused on production in two states, Paraiba and Pernambuco, while the Bank of the Northeast study included all states in the Northeast.

Table 9.49 shows some of the results of the cotton assembler survey. For each of the characteristics, the reader will note a wide range of responses and a mean which far exceeds the median. This illustrates the wide differences existing between the different buyers and ginners interviewed. About 10% of the sample were in the latter category and on most of the characteristics yielded the larger values. On the other hand, the very small rural gatherers and independent buyers, who are apparently only part-time cotton buyers, yielded the lower and middle values in the range.

Table 9.49 Structural Characteristics of Cotton Assemblers and Ginners, 1966

Characteristics	Range	Median	Average
Metric tons of raw cotton traded	0-9,300	70	719
Number of suppliers	7-998	48	127
Percent with major occupation--farmer	--	--	62
Percent with major occupation--ginner or assembler	--	--	13.2
No. full-time employees	0-98	0	4
Weekly wage bill (NCr$)	0-275.00	30.00	184.25

SOURCE: SUDENE/MSU Survey (1967).

Thus, on the average, cotton assemblers and ginners purchased 719 metric tons in 1966 from 127 different suppliers and used four full-time employees with weekly wages amounting to NCr$184.25. Only 13.2% of all assemblers interviewed considered cotton trading as their major occupation, while 62% list farming as their major source of income. The ginners appear to be the firms which are larger scale and provide full-time employment for the owner and perhaps other workers.

Competitive Behavior

As has been the case for other commodities, the rural cotton assembly system appears to meet the structural criteria of having a large number of buyers and sellers. In the 14-*municipio* area studied, there are an estimated 540 cotton buyers and 20 gins. Except for the ginners, who buy a small amount of cotton direct from farmers, these are relatively small-scale assemblers, none of which can significantly affect the market by his individual actions.

The floor price on unginned cotton is generally considered to be the price set by SANBRA at the beginning of each harvest season. Other ginners and assemblers tend to subtract their margins from that price and pay farmers accordingly. There are several other factors which work to limit competition among assemblers for the farmers' cotton. One of the most important of these is the granting of credit to farmers by assemblers who require that the farmer sell his cotton to them at harvest time. The following section on prices tends to indicate that prices are significantly lower for early harvested cotton used to repay loans. Thus, some farmers are required to sell at least part of their cotton to the assembler granting credit, and therefore have little opportunity to shop for a better price. When assemblers were asked why their suppliers chose to sell to them, 86.8% indicated a belief that their having advanced credit was the reason.

Another factor which tends to limit competition is a kind of social sanction against price competition among assemblers. Almost 66% of the assemblers agreed that the businessman who tries to expand his business by paying higher prices is not well thought of by other assemblers. Only 26% of the assemblers felt that competition was strong enough to limit their ability to expand their business.

Finally, 37% of the assemblers interviewed admitted that they had been approached by another assembler about the possibility of making a collusive price agreement. From the viewpoint of the assembler, this kind of agreement would be quite beneficial, since the natural geographic separation of the areas in which assemblers operate would mean that an individual would have to make agreements with relatively few assemblers in his area in order to share the local market. But this agreement may not be good for the farmers, and tends to keep assemblers from striving to lower their costs and improve their services.

In summary, there is little indication of strong competition among assemblers other than as related to advancing credit to farmers. At present there are no real assembler innovators competing strongly in the area studied who might force other assemblers to lower marketing costs and improve services. There is a general attitude of resignation to traditional methods of market operation. Among the buyers there seems to be a certain dissatisfaction with the business that they are involved in, which may indicate a trend for cotton buyers to leave the market. Fully 50% said that they would rather invest their money in another business than buy more cotton. Fifty-four percent of the smaller buyers replied that they would accept a job in a capital city if they could earn NCr$500-600 a month.

Prices and Margins

Table 9.50 shows the percentage of all reported farmer sales transactions from the survey with each type of assembler. It also gives the average prices paid by each type of assembler. As noted

Table 9.50 Relative Importance of Different Types of Cotton Buyers and Average Prices Paid by Each, 1966

Type of assembler	Percent of farmer transactions made with:	Average prices paid
Rural gatherers	47.6	25.6
Broker and ginner	45.4	24.8
Independent and itinerant buyers	7.0	30.2

SOURCE: SUDENE/MSU Survey (1967).

earlier in the discussion of the tree cotton channel map, rural gatherers and ginners, along with their brokers, are the most important sales outlets for farmers. Moreover, the average prices paid by those assemblers are very nearly the same. Since the SANBRA price is used as a basis and since there is little aggressive competition among cotton assemblers, the prices do not vary greatly. But average prices paid by independent and itinerant truckers are almost 5 centavos per kilo higher than prices paid

by other assemblers. This may be due to the fact that these itinerant and independent buyers have lower costs and margins or that they buy better quality products. Given the fact that itinerants represent a modernizing force in some other commodity markets, the first interpretation seems somewhat plausible. The fact that independent and itinerant buyers offer advance credit less often than other assemblers may also account for part of the price difference.

Virtually all of the tree cotton in the survey area is marketed between August and January, with September being the most active single month. Table 9.51 shows that during the harvest season of 1966 farmer sales prices were low during the major marketing months of August (21.5) and September (22.5) when farmers were required to sell to their creditor-assemblers at reduced prices. The average prices in October through January were considerably higher at about 30 centavos per kilogram.

Table 9.51 Farmer Sales Price for Cotton by Month, 1966 (centavos per kilo)

Month	Range	Median	Average
January	29-31	30	30
February	-	-	-
March	-	-	-
April	-	-	-
May	-	-	-
June	-	-	-
July	-	-	-
August	21-32	21	21.5
September	20-30	21	22.5
October	25-35	29.5	30.1
November	23-37	29.5	30.1
December	25-35	29.5	29.8

SOURCE: SUDENE/MSU Survey (1967).

Cotton assemblers were asked to give the minimum fixed mark-up required to cover all costs and provide a normal profit. Eighty-seven percent gave a figure of 10 centavos or less per kilo. The average was 6.6 centavos per kilo. By adding this average margin

to the average farm price for September, the most active market period, a base price of 29.1 centavos per kilo is obtained. The gross percentage margin for assemblers using this base price would be 22.7%. This margin is no doubt influenced very little by spoilage and loss, as was the case for other commodities in the study, since cotton is not perishable. This margin, therefore, would seem to be a bit high. It no doubt reflects the fact that assemblers responded with a desired margin rather than the margin actually realized. But it may also indicate a tendency toward high marketing costs due to the small scale of assemblers and primitive management and handling methods used.

Market Information

Earlier, it was noted that most assemblers based their prices on the price quoted by SANBRA, the largest ginner in the Northeast. Table 9.52 tends to verify the fact that most assemblers depend on their own market observation or other assemblers for price information. Similarly, farmers depend on their assembler-buyers and personal market observation for price information. Assemblers obtain information on market supply and demand conditions primarily from other assemblers. Radio is used by 18% of the assemblers for market condition information.

Table 9.52 Major Sources of Market Information for Cotton Farmers and Assemblers, 1967

Source	Farmers	Assemblers	
	Price information (%)	Price information (%)	Market information (%)
Assemblers	61.2	20.6	45.8
Market observation	24.2	39.7	15.8
Itinerants and brokers	--	10.3	11.3
Radio	.6	16.6	18.2
Telegram or commercial radio	--	4.8	5.4
Relatives and neighbors	12.7	--	--
Other	--	7.9	3.5

SOURCE: SUDENE/MSU Survey (1967).

In spite of the fact that some assemblers do obtain price and market condition information from regular radio broadcasts and through telegraph and commercial radio communications, the principal market communication media is word-of-mouth. Farmers, in particular, have no source of independent market information. They depend almost exclusively on market news from their buyers. This, coupled with the previously described absence of the competitive attitude among assemblers, indicates the imperfections of the market. Thus, the lack of accurate market information for all market participants contributes to the maintenance of the status quo and may be an important factor preventing the adoption of improved marketing practices.

Inspection and Quality Control

Cotton is ordinarily purchased after personal inspection, as are most other commodities in the Northeast. In the case of cotton, there is perhaps less of a chance for product damage than for more perishable food products. Nevertheless, the possibility of adulteration or excessive trash can lower the quality of fiber and reduce the yield after ginning. The following results from the assembler survey suggest that quality control is not a serious problem in rural cotton markets.

Sixty-eight percent of the buyers replied that their suppliers try to give good quality cotton and 96% indicated a belief that efforts to communicate quality preferences to producers can be effective. Despite the fact that 78% of buyers and ginners claimed to buy the quality that their customers prefer, only 55% said that they actually pay a price differential for quality.

The buyers and ginners were asked several questions on preferences and practices of their customers. Thirty-eight percent agreed that their customers believe that price is more important than quality (62% disagreed). Fifty-five percent thought that their customers did business with a number of suppliers in an attempt to get better quality. Eighty-two percent of buyers and ginners agreed that their customers expect constant quality.

Buyers and ginners were also questioned as to their opinions about their peers. Eighty-four percent thought that the other buyers knew how to buy good quality and 68% also thought that buyers generally do a good job in communicating quality preferences to producers.

The majority of cotton farmers (75%) accept as honest the weights that the buyers use. However, 16% feel that the buyers

cheat on weights; 9% do not know if they are being cheated. About half of the cotton producers own scales to check the weight of their product before sales. On the other hand, 57% of the assemblers indicated a belief that farmers sometimes try to cheat on selling weights. This suggests a good bit of distrust between farmers and assemblers and may point to a real problem of dishonest trading which adds confusion to an already imperfectly competitive market.

Storage

Most farmers reported some kind of storage facilities for cotton on their farms. Eighty-eight percent of farmers store cotton in their houses or in other buildings on the farm. Storage is rarely for longer than two months. The average storage capacity is 8845 kilos, with approximately 60% of the farmers having capacity ranging from 1,000 to 10,000 kilos. Seventy-two percent replied that they suffered no spoilage or loss, while others admitted to small amounts of loss.

Most assemblers have some storage facilities and appear to store cotton during and after the harvest season until it can be ginned. Only 14% of all assemblers had no storage facilities. On the other hand, 58% used some kind of bulk warehousing storage, while 20% stored in sacks in a building with concrete floors. The median storage capacity for assemblers in the survey was 150,000 kgs., with a range of 0 to 4,000,000 kgs. Most assemblers (95%) indicated that no public storage facilities were available in their area.

The importance of assembler storage is indicated by the fact that 64% of all assemblers in the survey stored some cotton for 30 days or more. Table 9.53 shows the amount of cotton stored by assemblers at various times in 1966. The table suggests that most of the cotton is removed from storage for ginning within four months after harvesting is completed. It is also clear that a few assemblers in the survey, probably the ginners, stored large quantities and thus pulled the average up to 73 tons, while 50% of the assemblers stored less than 5 tons at the end of harvest. The same pattern is evident at the other times noted in Table 9.53. There is apparently no arrangement whereby the farmer can pay the ginner for ginning his cotton while retaining ownership of the product for possible storage and later sale at higher prices. Rather, farmers must either store the seed cotton or sell at harvest to assemblers

or ginners, who then perform the storage and market rationing function. As a result, most farmers sell their cotton as soon as it is harvested, usually at lower prices, as was indicated earlier. This problem is aggravated for small farmers by the credit ties between themselves and assemblers.

Table 9.53 Cotton Storage by Assembler, 1966

Storage Period	Range	Median (metric tons per assembler)	Average
End of harvest	0-700	5	73
Harvest + 2 months	0-800	2	99
Harvest + 4 months	0-565	0	6

SOURCE: SUDENE/MSU Survey (1967).

Credit

The results of the interviews with producers revealed that, on the whole, credit supplied by ginners and buyers is of small significance. Only 15% of the total number of loans of the group interviewed were received from such assemblers. Cotton farmers seem to prefer government banks and credit cooperatives as sources of credit. (It must be made clear that the farm survey tends to have a disproportionate number of middle-sized landowners; a number of the very large and/or very small farmers were probably not included in the farm sample.) It seems likely that the smaller producers tend to rely on credit services extended by buyers. It is true that the majority of buyers and assemblers do extend some credit. Some buyers also run country grocery or hardware stores and thus sell supplies on credit, while the others lend cash. The small producers and sharecroppers often do, then, become tied to such buyers and local merchants through advances of money and goods. But those farmers who grow by far the major portion of marketed cotton do not rely heavily on buyer credit. This conclusion is also supported by the fact that less than 20% of total credit volume to cotton farmers surveyed is extended by buyers or assemblers. (Total credit volume to farmers in the cotton area was approximately NCr$11,200,000 in 1966, while buyers supplied roughly NCr$2 million of this total.) The cost of buyer/assembler credit was also

significantly higher than that of banks and cooperatives. The average interest rate charges per month by assemblers in 1966 was 3.7%, compared to an average monthly rate of 1.4% paid to all types of lenders by cotton producers (Table 9.54). In addition to the cost of credit, the terms of repayment exacted by the buyers would generally be unacceptable to middle-sized and larger producers because their bargaining position at the time of sales would be weakened. For the most part, buyers demand that their credit customers sell their cotton directly to them (i.e., to the buyers extending credit) or pay off the loan in kind. Few buyers answered that they would accept repayment in cash.

Table 9.54 Partial Description of Interest Rate Structure in Cotton Production Area of Pernambuco and Paraiba

	Average interest rate per month
Ginners pay the banks	2.1%
Small assemblers (buyers and brokers) pay ginners	2.7
Farmers pay small assemblers	3.7
Farmers pay small assemblers for past-due loans	4.2

SOURCE: SUDENE/MSU Survey (1967).

On the other hand, in the case of a bad debt most buyers would be content to wait until the next harvest or to try to settle the problem out of court. It appears that about 7% of the buyers' loans become bad debts. Sometimes there is an additional interest charged if payments on the debt are overdue, which makes the effective monthly interest rate a little over 4% on the average.

The majority of those buyers (77%) who demand that the cotton be sold to them (as part of the credit contract) set the price of such cotton after the harvest. Most (55%) claimed that they price the cotton at the current price level, while a few others admitted that they pay lower than the current price.

The credit cycle corresponds closely to the production season. Buyers generally begin extending credit in January and February and cut it off in June and July. Producers begin repaying

in September and some take as long as November or December to repay. The average duration of assembler loans to farmers in 1966 was 20 weeks.

The vast majority of assemblers (98%) borrow money themselves to advance to farmers and operate their own businesses. The most frequently mentioned sources were government banks (46%) at an average interest rate of 2.1% per month, other sources (43%) at 2.8% per month, and moneylenders (30%) at 4.5% per month. Obviously, assemblers prefer to borrow from government banks at lower rates, but due to credit rationing and collateral requirements, assemblers are forced to turn to other more expensive credit sources. Assemblers believe that credit availability and cost are an important factor limiting business expansion: 88% expressed the opinion that credit availability was a limiting factor and 68% said that high interest rates were holding them back.

Transportation

The most common method for transporting cotton from the farm to the first buyer is in rented trucks. Forty-three percent of the farmers in the survey used this method. An additional 15% used their own truck and 5% had their product transported in the buyer's truck. Thus, about 63% of the farmers reported using truck transportation primarily. The other major source of transportation was animal-back. About 34% of the farmers used this method. The high incidence of truck transportation is somewhat surprising in comparison to other commodities and when one reviews the type of roads on which the majority of assemblers are located. Over 65% of all cotton assemblers have their business located on oxcart roads with less than 35% on paved, gravel or graded dirt roads. While this suggests a possible limitation on the rural marketing system, the present study did not generate adequate information on existing roads in the area to arrive at a firm conclusion.

Summary

Cotton ranks as the most important source of foreign exchange for the Brazilian economy. It is the second most important agricultural product of the Northeast. Thus, it holds an important place in the regional economy. Yet production methods remain quite traditional, with little indication that any significant technological advancement will be made in the near future. This is in spite of the fact that world demand is strong for the long staple tree cotton

produced in the Northeast. On the other hand, while the quantity demanded seems to be rising, world cotton prices remain low. These low prices are reflected through the marketing system in the Northeast and further reduced by the fact that as many as 3 to 4 intermediaries commonly subtract their margins (ranging from 10 to 20%) from the prices offered farmers. As a result, farm prices are low. This, coupled with a nonprogressive, noncompetitive group of assemblers, poor market information in rural areas, limited rural credit, and lack of farmer opportunity to finance or retain ownership during the processing and storage of this product while seeking a higher price, has produced an environment in which farmers have little incentive to seek out and adopt the costly farming innovations required to raise productivity and, eventually, profits.

The conclusion seems to be that the structure and conduct of the present cotton marketing system is placing a heavy burden on producers. It seems likely that a few progressive cotton buyers or ginners who were willing to bypass certain intermediaries in the market could perform a much-needed service while creating a competitive force which might lead to more streamlined, lower-cost, and more effective cotton marketing. The eventual benefits of such a system would accrue to farmers in the short run and to society in the long run as producers responded to higher prices by adopting more efficient production methods.

The Marketing System for Milk

Introduction

Milk is a highly nutritious food that is important to the Recife consumer's diet. The largest percentage of Recife milk consumption is in the form of powdered milk, followed by pasteurized milk and unpasteurized fluid milk. Other milk products are butter and cheese, of which a significant quantity is locally produced, and condensed and evaporated milk which, along with powdered milk, is largely purchased from southern Brazil. Major emphasis in this study is on the marketing of fluid milk through the state-owned pasteurizing plant in Recife.

Data from the Getulio Vargas Foundation show that in 1960 Brazil as a whole was largely self-sufficient with respect to milk production and consumption. About 1/2 of Brazil's total consumption of 6.6 million tons was consumed as fluid milk. Another 10%

was consumed in the form of powdered milk and the balance as milk products.

In 1960, per capita consumption of fluid milk for all of Brazil was 94.1 kgs., with an urban per capita consumption of 91.5 kgs. and rural per capita consumption of 97.0 kgs.[7] In contrast, a Bank of the Northeast study in 1960 estimated per capita fluid milk consumption in the city of Recife at about 20 kgs.[8] At that time no pasteurizing plant was operating in the city, so the entire amount was unpasteurized. No per capita data are available for rural consumption of fluid milk in the Northeast, but there is little doubt that consumption is much lower than the average quoted earlier for all of Brazil. An indicator of the low rate of fluid milk consumption in all the Northeast is the fact that in 1965 about 11% of Brazil's total milk production came from the Northeast, which had over 30% of the country's population.

The Getulio Vargas Foundation has estimated that total milk production in Brazil will increase by 33% between 1965 and 1975. Demand for milk is expected to increase a bit more, leaving a small deficit to be filled by imports (Table 9.55).

Table 9.55 Projection of Milk Supply and Demand in Brazil (1,000 metric tons)

Year	Actual demand	Internal supply	Actual deficit
1965	7,680	7,590	-90
1970	8,950	8,840	-110
1975	10,440	10,310	-130

SOURCE: Getulio Vargas Foundation, *Supply and Demand Projection of Agricultural Products for Brazil*, Vol. 1, p. 153-55.

Milk production in selected states of Brazil is shown in Table 9.56. Minas Gerais is the leading milk producing state in Brazil and São Paulo is the second largest producing state. Bahia is the largest milk producing state in the Northeast. It

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[7]Getulio Vargas Foundation, *Supply and Demand Projection of Agricultural Products for Brazil*, 1966, Vol. 1, p. 49.

[8]SUNAB, Recife, Brazil. Unpublished data.

is also evident that Bahia has the largest rate of increase in milk production during the years 1963-1965. The state of Pernambuco shows the smallest increase in milk production for those same years. It is apparent that milk production in Pernambuco has failed to grow as rapidly as in other states in the Northeast and the South.

Table 9.56 Milk Production in Selected States, 1963-65 (1,000 lts.)

State	Milk Production			% Increase 1963-1965
	1963	1964	1965	
Minas Gerais	1,806,771	2,040,292	2,162,721	19.7
São Paulo	1,275,650	1,429,800	1,487,507	16.6
Bahia	185,446	239,896	281,478	51.8
Pernambuco	99,780	100,299	113,294	13.5
Paraiba	69,543	74,347	79,812	14.8

SOURCE: IBGE - Statistical Annual of Brazil: 1966, p. 111.

It is estimated that in 1967 the Recife consumption of fresh fluid milk was approximately 50,000 liters per day, of which 80% was pasteurized and 20% was sold to the consumer as raw milk.[9] The results of a consumer survey in Recife are presented later in the milk marketing section. The results indicate a potential for substantial expansion in milk consumption. Apparently powdered milk is widely used and is largely imported from central and southern Brazil and from the United States.

The Farmer Marketing System

Milk production in the Northeast is concentrated largely in the Agreste area. Virtually all of the milk supply for Recife's only pasteurizing plant (CILPE) is drawn from that area of Pernambuco. However, most of the unpasteurized milk sold in the city comes from small producers in the humid zone around Recife.

[9] CILPE, Recife.

Since the current study focuses on the major and only legal fluid milk supply market for the city of Recife, the farmer survey as described earlier, is composed only of farmers who had sold milk to CILPE in 1966. The following description of farmer marketing activity is based on that survey conducted in July of 1967.

Quantity Produced and Sold

Table 9.57 shows the average daily milk production per farm in 1965 and 1966. These averages are skewed upward by a few large producers. While these are yearly averages, the data indicated that daily production per farm increased by about 10 to 15% during the dry season due primarily to heavy feeding of cottonseed meal at that time.

Table 9.57 Average Daily Milk Production, Average Daily Home Consumption, and Average Daily Sales per Farm in Sample, 1965-1966 (liters)

	1965	1966
Average daily production	68.5	72.4
Average daily home consumption	9.0	9.3
Average daily sales	59.5	62.9

SOURCE: SUDENE/MSU Farmer Survey (1967).

Average daily sales after home consumption and loss were 59.5 liters in 1965 and 62.94 in 1966. The majority of farmers in the survey (59.5%) sold all of their milk to CILPE in 1966. Of the remaining farmers, 12.7% sold all their milk elsewhere and 27.8% sold part of their milk to other buyers.

For those who sold to buyers other than CILPE, the major market was local consumers (16%), local cheese or butter factories (14%), and other milk buyers who came to the farm (6%). Thus, the major buyers other than CILPE for farmers in the sample were consumers and small local businessmen.

The survey showed that cows are milked by hand under quite unsanitary conditions. Only about 12% of the farmers followed the practice of washing the cow's udder before milking. In most cases the cows are milked in the corral with other cattle and calves. In addition, very few had any method at all for cooling the milk.

Such handling practices present a serious health problem and lead to a high rate of milk spoilage in the marketing system. CILPE has special problems, since the milk handled under these conditions must be assembled and transported to their collection posts before any refrigeration can take place. The milk must then be transported 50 to 220 kilometers in cans in open trucks before it can be pasteurized.

Transaction Procedures

Milk producers typically milk their cows only once a day--usually very early in the morning. For those who sell to CILPE, the milk is picked up at the farm each morning by an independent trucker. In some cases these individuals are CILPE suppliers who transport their own milk and that of their neighbors. These transporters are paid 1.5 to 2.0 centavos per liter depending on the distance traveled. At the farm the milk is transferred from the producer's containers to CILPE cans and the driver records the amount of purchase. When the milk arrives at the collection post, it is strained and cooled immediately and each producer's sales are recorded for the day. Checks to producers are issued by CILPE once a week.

Sales to outlets other than CILPE may involve a variety of procedures. The farmer may deliver the milk daily to individual consumers in nearby areas or to small cheese or butter factories. The latter serve especially as an outlet for the lower quality milk. On the other hand, the farmer may sell his milk to a middleman who distributes to consumers in nearby towns or he may produce butter or cheese himself for local sale.

Of the major sales outlets, CILPE generally provides the producer with a more stable market demand at fixed prices. However, in some cases prices are higher for producers having regular distribution routes or sales arrangements for raw milk to be consumed locally. The cheese and butter factories generally pay lower prices. They will purchase high acid milk and the overflow of production after the other two market demands are satisfied.

The Recife Milk Pasteurizing Plant

Background

Companhia Industrialização do Leite de Pernambuco (CILPE) is a mixed company with 99.7% of its stock being held by the state

government of Pernambuco. Operations were begun in the present location in 1938. At that time, the plant was directly owned and operated by the state of Pernambuco. Facilities in the plant were quite adequate. It has been noted that "the operation of the plant was quite an example for the country."[10]

By 1949, the plant was in such poor condition that the state government decided to carry out a complete remodeling program. Bids for materials were accepted in 1950. After 1951, remodeling was continually delayed by a lack of funds and other political reasons. It was finally completed in 1961. Meanwhile, the city was completely without pasteurized milk for a period of about 11 years.

In December of 1951, the present mixed economy company was organized by the state government. Under the new organization, the state government holds 99.7% of the stock. The balance is held by directors of the company. The president is usually a political appointee of the state governor. This has resulted in periodic changes in company management which, in turn, have hampered long-range development of the company.

When the CILPE plant finally began operations again in May of 1961, most of the equipment was new. The present pasteurizing, bottling and storage capacity of the plant is 80,000 liters per day. During the season of peak volume, it is currently used at about 60% of rated capacity.

One of the major problems which the company has faced since re-opening is the seasonal fluctuation in milk supply. Table 9.58 shows the months of maximum and minimum average daily purchases by CILPE from May 1961 to September 1967. The table indicates that frequently during the season of short supply between July and November average daily purchases declined to about 1/2 of the purchases during the month of maximum production. It should be noted that in 1967 the regular pattern has been reversed. This is a result of special efforts by CILPE to make their supply constant. The company has made an arrangement to purchase milk from a milk products factory in Batalha, Alagoas. The fact that more milk was received during the slack production season than during the busy season of 1967 is attributable to a special sales promotion program. CILPE sales are rising steadily and in order to meet the consumer demand the

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[10] J.M. da Rosa e Silva Neto, *Contribução para um Plano de Desenvolvimento da Produção, Beneficiamento e Industrialização do Leite em Pernambuco*, Commissão de Desenvolvimento Econômico de Pernambuco (Recife: 1961), p. 71.

company is paying higher prices to producers to encourage greater production.

Table 9.58 Months of Average Minimum & Maximum Daily Milk Purchases by CILPE, 1961 - 1967

Average daily purchases (liters)	Month	Year
Maximum - 38,933.9 Minimum - 26,062.9	December May	1961[a]
Maximum - 39,034.8 Minimum - 18,100.4	January November	1962
Maximum - 32,571.2 Minimum - 20,790.9	February November	1963
Maximum - 45,924.4 Minimum - 23,712.0	February July	1964
Maximum - 43,658.2 Minimum - 31,807.3	May September	1965
Maximum - 42,528.2 Minimum - 23,980.7	March August	1966
Maximum - 48,629.0 Minimum - 37,240.0	September May	1967[b]

[a]Plant begins operation in May.

[b]Includes statistics through September only.

SOURCE: CILPE.

The Rural Collection System

At the present time, CILPE's principal supply area is the Agreste of Pernambuco. During the period from 1938 to 1950, the major supply area was the *municipio* of Recife and neighboring *municipios*. However, as the city grew and land values climbed, more and more dairymen near the metropolitan area were forced out of business. When CILPE reopened in 1961, three rural collection posts were in operation--one each in Gravata, Limoeiro and Caruaru. The major supply area was still the *municipio* of Recife and nearby areas. Then in 1962 collection posts were opened in Bezerros, São Caetano and São Bento do Una, pushing the supply further into the Agreste. Finally, in 1965 and 1966 posts were opened in Surubim, Belo Jardim and Pesqueira. The latter is already CILPE's largest post. Table 9.59 presents a description of each of CILPE's nine collection posts.

Table 9.59 Characteristics of CILPE Collection Posts, 1967

Town	Daily cooling capacity (liters)	Bulk storage capacity	Type transport to Recife	Distance to Recife (km)	First year of operation	Number & ownership of delivery trucks/rec.	Does post receive milk from farmers twice daily?
Bezerros	2,000	0	Flat bed truck (100 cans)	100	1962	1 CILPE	No
Gravata	4,000	0	Flat bed truck (100 cans)	80	1961	1 CILPE	No
Caruaru	6,000	0	Flat bed truck (100 cans)	130	1961	1 CILPE	No
Limoeiro	6,000	0	Flat bed truck (100 cans)	76	1961	1 private	No
Surubim	6,000	0	Flat bed truck (100 cans)	120	1965	1 private	No
São Caetano	15,000	0	Flat bed truck (100 cans)	150	1962	1 private	No
Belo Jardim	2,000	0	Flat bed truck (100 cans)	240	1966	1 private	No
Pesqueira	30,000	20,000	Bulk tank truck (14,000 liters)	240	1966	1 PLAMAM	Yes
São Bento do Una	30,000	20,000	Flat bed truck (100 cans)	212	1962	1 private 1 CILPE	Yes

SOURCE: CILPE, Recife (1967).

The milk is collected and delivered to these posts by private truckers hired by CILPE. Dairymen take the milk from the cows very early in the morning. The trucker then passes by the farm a little later in the morning to pick up the milk. He transfers it into CILPE cans and delivers it to the rural collection post in his open truck, pick-up or Volkswagen bus. Each collection post has from one to ten truckers collecting milk and delivering it to the cooling station.

As soon as the milk arrives at the post, each can is tested for acidity. If the milk is acceptable, the farmer's account is credited at a price of 24 centavos per liter. If the milk is acid, it is accepted, but the producer is paid at a rate of 12 centavos per liter. The producer usually comes to the post to pick up his check once a week, though in some cases the trucker delivers the checks to the dairymen.

At the collection post the milk is immediately strained and cooled to a temperature of approximately 3° centigrade. In all CILPE posts except Pesqueira, the milk is placed in 55-liter cans to await transfer to the Recife plant in open bed trucks covered with wet tarpaulins. In Pesqueira, the milk is placed in an insulated storage tank after cooling. Most of the milk is transported from that post to Recife in an insulated tank truck with a capacity of 14,000 liters. Table 9.59 indicates that in most cases CILPE does not own the trucks used to deliver the milk to Recife. Private truckers are hired at a rate of 1.5 to 2 centavos per liter to provide this transportation. The bulk tank which operates between Recife and Pesqueira belongs to the federal milk improvement agency, Plano de Melhoramento da Alimentação e do Manejo do Gado Leiteiro (PLAMAN), but it is on long-term loan to CILPE.

The Processing Plant

The present CILPE plant was constructed in 1938. It is located in a congested area near downtown Recife, making entry and exit by large trucks somewhat difficult. Most of the equipment in the plant is in good condition, having been purchased during the remodeling before the plant was re-opened in 1961.

With present facilities the plant's pasteurizing capacity is about 80,000 liters per day, though most of the equipment in the plant has a significantly higher capacity. For example, the capacity of the two pasteurizers is 5,000 liters per hour each, the two filling and capping machines have a capacity of 4,300 liters per hour each, and there is a bulk storage capacity of 48,000 liters.

The primary factor limiting the expansion of plant capacity is the amount of refrigerated storage space available for bottled milk. The present facility will handle 24,000 liters. The company does not presently use refrigerated or even insulated trucks for delivery, so there is no possibility of expanding bottled storage capacity by loading delivery trucks early. At the present time, the plant is processing about 40,000 liters per day. Yet the limited bottled milk storage capacity has already forced the company into special operating procedures.

Presently, the CILPE pasteurizing plant operates from 9:30 a.m. to 6:30 p.m. The first milk arrives in the 14,000-liter tank truck from Pesqueira at about 7:00 a.m., after having left the collection post at midnight. The milk is received at the post both in the morning and afternoon; it is cooled and stored in an insulated tank until the tank truck arrives. The approximately 7,000 liters per day which CILPE is now purchasing from a milk products factory in Alagoas also arrives in a bulk tank truck between 7 and 9:00 a.m. The milk from these two bulk deliveries, about 21,000 liters in all, is immediately unloaded and pasteurized during the morning. The resulting bottled milk is then placed in trucks for afternoon delivery. The balance of CILPE's daily milk supply arrives in the afternoon on flat bed trucks carrying a maximum of 100 55-liter cans. The milk is cooled to 3°C at the collection post before being placed in cans and loaded on tarpaulin-covered trucks. Nevertheless, after 2-4 hours under the tropical sun in an open truck, the temperature of the milk ranges from 20° to 30°C on arrival in Recife. The canned milk is unloaded, pasteurized and bottled as soon as it arrives. It is then placed in the 24,000-liter refrigerated storage area until midnight, when loading begins for morning deliveries.

Thus, by careful scheduling of raw milk receipt and bottled milk delivery, the company is able to get by with the present storage capacity for bottled milk. But as daily sales go over the 50,000-liter mark, the company will be hard-pressed to solve the storage problem without greater fixed storage capacity of insulated delivery trucks. The latter alternative seems more feasible, since insulated delivery trucks are needed to improve the distribution system anyway.

The CILPE plant is basically intended as a milk pasteurizing facility. Hence, the capacity for manufacturing other dairy products is limited. Facilities exist for manufacturing 600 kilos of butter per day from the excess cream after standardization of pasteurized milk at 3% butterfat. Milk receipts of 45-55,000 liters

have recently been yielding sufficient excess butterfat to produce about 200 kilos of butter per day. There would appear to be sufficient capacity to handle the excess butterfat from as much as 150,000 liters of raw milk per day.

The other products produced by CILPE are cheese and yogurt. In both cases production capacity is quite low. The present level of acid milk receipts of 1,000-3,000 liters per day is already pressing upon the maximum capacity of the plant to turn it into salable products.

The Distribution System

As mentioned earlier, there are two delivery times for CILPE milk. About 1/2 of the present production is loaded on covered but non-insulated trucks for delivery in the early morning hours. The balance is loaded on similar types of trucks at midday for afternoon delivery.

The CILPE distribution system consists of 377 sales posts scattered throughout the metropolitan area. Daily sales in these posts range from a maximum of 1,000 liters to as little as 20 liters in the smaller posts. The majority of these distributors sell from 50 to 120 liters per day. CILPE establishes the retail price for all its distributors (40 centavos per liter in December of 1967) and pays them a handling margin of 1.8 centavos per liter. In most cases the sales posts are restaurants, bars, or poultry and meat specialty stores. Very few of these milk distributors are retail grocery stores. CILPE requires that these posts have refrigerated storage space, though in many cases it is not used for milk. Reasons cited for this practice are that most of the milk is sold within an hour after its arrival and that the owners reserve limited refrigerator space for higher margin soft drinks. Due to this practice and the absence of refrigerated or even insulated delivery equipment, the milk may have been exposed to high external temperatures for as long as 12-14 hours by the time the consumer gets it. This, in addition to the long hours that the product may have spent at high temperatures during the collection process, is the reason why consumers have found CILPE milk spoiled often enough to form the opinion that it is not good for the individual.

At the present time, CILPE is using ten delivery trucks to service the needs of 377 distribution posts. These delivery trucks are privately owned. The owners receive 1.3 centavos per liter for the delivery service. Each truck usually carries two men in addition to the driver; these men unload and carry the milk into the

distribution posts by hand, and are paid by the owner of the truck. Each of the ten trucks has a route specified by CILPE. The total milk delivered per route ranges from 3,000 to 5,000 liters per day. The length of time required to cover the route ranges from four to ten hours, with an average of eight. CILPE is now planning to revise delivery routes and add five more trucks in order to cut down on the length of time required for delivery. Such a revision is essential, especially in view of the fact that company sales were at an all-time high in July, August and September of 1967, and were still climbing steadily. The shorter delivery time should have a favorable impact on the quality of the milk arriving at the distribution post.

Consumer Demand and Competitive Forces in the Recife Milk Market

Table 9.60 shows the results of a series of questions regarding milk which were included in the consumer survey analyzed in Chapter 3. It indicates that about 75% of the families in Recife drink milk.[11] When those who do not drink milk were asked why, the majority (58.6%) responded that milk is too expensive. These, no doubt, are low-income families who cannot afford milk at present prices. Of those who do drink milk, 37.7% responded that only children or babies consume the product. Table 9.60 indicates that, of the consumers who drink milk, 11.2% buy unpasteurized milk, 28.8% buy CILPE pasteurized milk, and 58.8% buy powdered milk. A second response from some consumers indicated that almost 10% use both powdered milk and some type of fresh milk.

It was noted earlier that in former years one of CILPE's major problems has been the seasonal fluctuation in its milk supply. This scarcity of milk during the months of July to November has often resulted in CILPE's distribution posts not being able to fill consumer demand. When those families who do not drink CILPE milk were asked to give reasons why, almost 25% said it is because the product is not regularly available. Apparently many Recife consumers have found their neighborhood posts out of milk often enough to decide that the utility of the product does not outweigh the inconvenience created by the uncertainty of its availability on any given day.

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[11] The percentage of families using milk in Recife is probably slightly higher than 75%, since there is a good possibility that families who buy milk for cooking but do not drink it gave a negative reply to the question, which was worded "Does your family drink milk?".

Table 9.60 Milk Consumption in Recife[a]

Does your family drink milk?		
Yes	75.4%	
No	24.6%	
Of those who do not drink milk, reasons given why not:		
Not healthy	4.6%	
Too expensive	58.6%	
Taste not good	18.4%	
Not available regularly	4.6%	
Cannot buy less than 1 liter	4.6%	
Other	9.2%	
Total	100.0%	
Of those who do drink milk:		
What type of milk does your family drink?	First response	Second response
Unpasteurized	11.2%	.4%
CILPE	28.8%	.4%
Powdered	58.8%	9.7%
Other	1.9%	.4%
No second response		89.1%
Total	100.0%	100.0%
Of those who do not drink CILPE milk:		
Why not drink CILPE milk?		
Not healthy	15.4%	
Spoils easily	6.0%	
More expensive	7.7%	
Doesn't taste good	16.0%	
Not available regularly	24.7%	
Sales post too far away	6.6%	
Not available when can afford	1.6%	
Cannot buy less than 1 liter	4.4%	
Other	17.6%	
Of those who do drink CILPE milk:		
Would you buy CILPE milk at supermarkets and *mercadinhos* if it were available?		
No	30.0%	
Yes	63.8%	
Don't know	6.2%	
Total	100.0%	

[a]Figures in table represent estimated percent of families with a given characteristic in the city of Recife.

SOURCE: SUDENE/MSU Consumer Survey of 354 households in Recife (1967).

Recife consumers also appear to hold the opinion that CILPE pasteurized milk is either not healthful or spoils easily. Those two reasons for not buying CILPE milk were given by 21% of the

consumers in the survey. This no doubt is partially due to the fact that these consumers, on occasion, have had the experience of purchasing CILPE milk that was already acid or became acid shortly after the purchase was made. The consumer needs only to have a few such experiences to conclude that the product is contaminated.

These data suggest that there is a large potential market for high quality pasteurized milk in Recife if it can be supplied at a reasonable price. CILPE milk now reaches only about 22% of the families in Recife. This is probably less than 1/2 of the company's potential market, since the consumer survey showed that 45% of the families in Recife have refrigerators. On the other hand, twice as many (44%) of the families in the city are consuming powdered milk at a fluid equivalent price of about 16 centavos more per liter and 25% are not consuming milk at all. In order for CILPE to tap this potential market, two problems must be solved simultaneously: (1) the company must make whatever investments or changes are necessary to assure that sufficient supplies of high quality milk are available at all times on the refrigerated shelves of a wide range of distributors and (2) the company must convince Recife consumers that its pasteurized milk is healthful, nutritious, economical and conveniently available.

The CILPE management is already aware of the need to change consumer opinions regarding its milk. A broad promotional campaign launched in June of 1967 has been at least partially responsible for the increase in sales in July, August and September. The program has included a variety of promotional techniques. Small signs have been purchased and placed at each distribution post to inform the public that CILPE milk is sold by the establishment. The company has retained an advertising agency to coordinate a program of radio and television advertisements. The program has included spot announcements at various times during the day on a local radio station and a short advertisement on a television channel each evening. Finally, the company has inaugurated a promotional campaign among its distributors whereby each one is given a quota based on sales during a specific ten-day period. When the distributor's sales exceed the established daily quota, he is paid NCr$0.23 per liter on all the excess rather than the regular NCr$0.18 margin.

These promotional efforts are definitely a step in the right direction. They should, however, be more specifically directed toward altering the product's image of unreliable supply and low product quality. If such improved promotional activities are coor-

dinated with needed improvements in the raw milk collection and pasteurized milk distribution, the company can begin to fill a real need for widespread distribution of fresh milk in this city of over one million people which has no other source of supply for pasteurized fresh milk.

Competition from Powdered Milk

In the preceding section it was noted that 44% of all the families in Recife drink powdered milk, while an additional 7% drink both powdered and fresh milk. It is therefore estimated that well over 50% of the families in Recife are now buying powdered milk regularly. In comparison, only about 22% now purchase CILPE milk regularly.

Data from the consumer survey, along with information from CILPE and powdered milk distributing firms, were used to estimate the present total weekly consumption of fresh milk and fluid equivalent of powdered milk in Recife. The weekly total is approximately 920,000 liters. Of that total, it is estimated that 44,000 liters are unpasteurized milk, 280,000 liters are pasteurized milk, and 596,000 liters are powdered milk. At an average price of NCr$0.56 of reconstituted powdered milk per liter, Recife consumers in late 1967 were spending NCr$333,760 per week for powdered milk. At the time of this study, CILPE pasteurized milk could be purchased at NCr$0.40 per liter, or NCr$0.16 less than powdered milk. Hence, consumers could have saved NCr$95,360 per week by shifting from powdered to pasteurized milk if it were available at the NCr$0.40 per liter price.

Since most of the powdered milk sold in Recife is now imported from the South, the complete substitution of fresh pasteurized milk for powdered milk would, in addition, provide a powerful stimulus to the agricultural economy of Pernambuco and neighboring states. The results of the dairy farmer survey indicate that milk producers will expand output when a stable market outlet is provided at fair prices. The survey also gave a strong indication that Pernambuco dairy farmers are likely to expand output through productivity improvements as well as herd expansion if stable marketing conditions prevail.

The above discussion suggests again that the potential for pasteurized milk sales is indeed great in Recife. It also suggests that the possible development impact of fresh milk substitution for powdered milk is significant. Yet it should be recognized that, in spite of the fact that CILPE prices are less than the average price

for powdered milk, certain differences in product characteristics and availability tend to justify the price differential in the minds of consumers. In general, powdered milk has greater purity and storage flexibility and is sold at every retail food store as well as at many bars, restaurants, public market stalls, and *feira* stands. This well-developed distribution system, coupled with effective advertising and merchandising by powdered milk distributors, provides formidable competition for CILPE's pasteurized milk.

Summary

It is clear that a strong potential demand exists in Recife for fresh milk. Powdered milk from southern Brazil now makes up over 1/2 of the city's supply of fluid milk. However, Recife consumers have little confidence in the quality of CILPE's pasteurized milk and deplore the uncertainty at which it has been available in the past. This study has shown that both of these consumer complaints have good foundation.

In most cases, the milk purchased by CILPE is produced under unsanitary conditions. This problem is compounded by the fact that the milk is not initially refrigerated for several hours and even after refrigeration at the collection post must, in most cases, be transported to the pasteurizing plant and distributed without refrigeration. In addition, the CILPE milk supply has historically varied significantly during the year.

CILPE's basic procurement policy has been to encourage only production of that amount of milk which can be sold in fluid form. The company has attempted to avoid having surplus milk, since their milk products manufacturing capacity is quite limited. Thus, through a certain number of regular suppliers, the company may have been able to supply the city's apparent needs for pasteurized milk well during the season of greatest production, but when average production went down among those farmers, CILPE has no alternative source of supply and was forced to ration the smaller amount of milk among its distribution outlets. This in turn created milk shortages at some posts from time to time and produced the prevalent consumer image that CILPE's supply of pasteurized milk is unreliable.

The company has made some progress toward improving product availability and distribution, but much remains to be done in that area as well as in the area of sanitation and refrigeration improvements on farms and in the distribution system. Nevertheless, the

benefits in the form of consumer savings, improved nutrition and agricultural development would seem to easily offset the costs of making those improvements in the state-owned Companhia Industrialização do Leite de Pernambuco.

CHAPTER 10

THE RURAL MARKETING SYSTEM-- CONCLUSIONS AND RECOMMENDATIONS

General Conclusions

About two-thirds of the population of Northeast Brazil live on farms or in villages of less than 2,000 people. Yet agriculture accounts for only 46% of the region's income. During the decade from 1952 to 1962 there was an average yearly growth in real farm production of 6% in the Northeast. Nearly all of that increase can be accounted for by an increase in cultivated acreage. There is very little evidence to indicate any appreciable improvement in crop yields during recent years. Farmers in the region continue to use traditional methods and technologies. The continued growth in aggregate demand for agricultural products is met primarily by cultivating more land and in some cases by imports from the South.

Agricultural technologies are available or could likely be developed which could significantly increase yields if utilized by Northeastern farmers. This could produce a shift in the aggregate supply curve which would mean larger product supplies at the same or even lower prices. This could lower food costs to consumers and improve farm incomes. However, to date there has been no dynamic interaction between rural and urban areas which could set in motion a growth process and provide incentives for adopting new technologies. The problem of agricultural development in the Northeast is to find a way to stimulate such an interaction growth process which could provide incentives leading to a technological revolution among the region's farmers.

The marketing system serves as an important link between rural and urban areas and can serve as a stimulant to a technical revolution. The present section summarizes some of the conclusions regarding the rural marketing system and suggests programs which can begin to effectively link rural and urban areas and raise agricultural productivity. The commodities studied include rice, beans, manioc, cotton and milk in seven different supply areas for the Recife foodshed.

The average gross income per farm for producers ranged from a high of NCr$11,593 for milk producers to a low of about NCr$1,500

for cotton and manioc farmers. In some instances, total sales per farm included products sold for sharecroppers. The survey sample focused primarily on landowners who participated in the market economy. It was found that 20% of the São Francisco rice farmers and 29% of the cotton farmers had sharecroppers. Cotton farmers who had sharecroppers had an average of 3.7 per farm, while São Francisco farmers had an average of 13.3. The most common sharecropping arrangement is for the landowner to receive 50% of the production. There was relatively little sharecropping among bean, manioc and dairy farmers.

In the rural areas studied, education and literacy levels are low, mass media exposure is limited, and, as a result, attitudes remain relatively traditional. From 37 to 56% of farmers in the different commodity areas indicated an ability to read and understand a simple sentence, while the percentage of literate assemblers ranged from 49 to 85%. As a result of the low literacy level, low incomes, and poor communication linkages with urban areas, farmers have little exposure to the printed media. Even assemblers, with a higher literacy rate, do not often read magazines and newspapers. On the other hand, most farmers and assemblers do listen to the radio and some watch television occasionally. In general, radio appears to be the most promising form of mass media for reaching both farmers and assemblers with marketing, management and technical information.

Data on illness among farmers in the survey suggest that farm productivity may be limited by sickness, especially among rice farmers, where over a third of the farmers missed 20 days or more of work in 1966 due to illness. Among all farmers, 26% missed over 20 days of work in 1966. However, while sickness could be an important limitation on productivity, it is not believed that illness would prevent most farmers from responding to appropriate market incentives with greater output. An effective way to combat the health problem is through programs which help farmers obtain higher incomes which will permit better diets and improved health care.

Most farmers in the survey obtained the majority of their gross income from the sale of one product. Rice farmers in the São Francisco area obtained 86% of their gross income from rice sales, and bean farmers earned 57% of gross sales from bean production. For cotton and manioc producers, the percentage of income earned by sale of one product fell between these two extremes, while dairy farmers earned virtually all of their incomes from

milk and cattle sales. The most important secondary farm enterprise for all farmers was livestock production.

Average plantings to the major crop enterprise ranged from about 4 hectares for manioc farmers to 10 hectares for beans and 11-20 hectares for rice growers. It is estimated that cotton producers had an average of 10-15 hectares of tree cotton per farm. For all products, yields were significantly lower than in southern Brazil or in developed countries. Moreover, producers appear to have little knowledge of methods for increasing yields. Of all farmers, over 40% could not respond when asked if they knew how to increase yields in their major enterprises. Those who did respond gave a wide variety of answers.

Based on the general results of this study and a review of agricultural development literature, it has become clear that rural development in the Northeast depends upon a technological revolution among farmers. Much of the basic technology required for such a revolution is already available or could be adapted for use in the Northeast. Research is needed to further develop and test these technologies. Demonstrations and educational programs will also be needed to extend information to farmers. Due to the large number of interdependent and complementary variables which must be considered, the task of accomplishing such a desired technological revolution is complicated and expensive. However, there are different classes of problems which must be overcome if the job is to be done. None of these is being completely ignored at the present time in the Northeast, but much more emphasis needs to be placed in individual areas and, more importantly, greater understanding of the interrelationships among these classes of problems is required before meaningful rural development programs can be designed.

Four classes of problems are:

1. low knowledge levels among rural people and highly traditional attitudes and actions growing out of illiteracy and poor education;

2. limited agricultural research which could help provide guidance for decision-making--this includes research both in the physical and social or economic sciences;

3. inadequate or costly distribution systems for the kinds of farm inputs necessary to support the desired technological revolution, such as improved seeds, fertilizer and insecticides; and

4. unstable and poorly coordinated marketing channels through which agricultural products are assembled and distributed to consumers.

The next three sections of this chapter present the conclusions of the present study with respect to these four classes of problems and consider the special case of milk marketing. The discussion will focus first on conclusions and recommendations related to product marketing but will consider, where relevant, the first two sets of problems mentioned above. The second section will summarize the conclusions and recommendations relating to the factor market and will also consider the highly related problems of low knowledge levels and inadequate research. The third section will review the conclusions regarding milk marketing and present specific recommendations for improving the CILPE collection and distribution system. Although the recommendations for rice, beans, manioc and cotton are grouped under separate headings labeled product and factor marketing, they should be regarded as a highly complementary package.

As one contemplates the complexity of the development problem and reviews the conclusions drawn from the present study, the interrelationships become apparent. For that reason and due to the novelty and high cost of this integrated approach, it is suggested that well-defined and relatively small geographic areas be chosen to carry forward a complete program for one or more commodity areas. If resources permit, the total program could be carried forward in one major area for each of the four commodities. If that is not possible, it is suggested that, rather than use scarce resources to develop one or two of the recommendations in several different areas, an effort should be made toward selecting one commodity and one area for the program. In this way, the true complementarity of the various aspects can produce additional benefits. In the long run, as new areas are brought into the program in order to eventually cover the entire Northeast, the total cost of the program should be less than would be the case under a "shotgun" development approach.

It is recognized that there are certain political hazards associated with singling out a particular commodity and region for such special treatment. But from an economic standpoint there seems to be little doubt that the long-run development cost savings to society of such an approach would be substantial. Nevertheless, these are the kinds of resource allocation decisions which must be left to those who understand thoroughly the political and social undercurrents of the region.

Due to the information available in this report, it is strongly suggested that if the integrated program is to be carried forward, it should be focused in the rural areas where the current study was conducted. The following is a listing of suggested priorities by commodity and area. The evidence suggests that the greatest short-run response potential for the suggested programs exists in the rice producing area of the lower São Francisco River Valley. These producers appear to be most receptive to modern farm inputs and appear to be economically able to immediately take advantage of such a program. Second priority should be given to the bean producing area in Alagoas and Pernambuco. While farmers there may not currently show highly modern attitudes, the potential exists for longer-run benefits which can spread into surrounding bean producing areas. Third priority should be given to the Irecê bean area, where some progress toward use of modern farming methods is already under way. But it is very possible that the development trend in that area will continue with the assistance of present, less intensive development programs. Fourth priority should be given to the cotton producing area. It seems likely, however, that the early phases of a program in that area would need to focus on research to more clearly identify the specific technical aspects of a development program. The current research program was not broad enough to cover all these issues and provide specific recommendations. The lowest order of priority is given to manioc and then the Maranhão rice producing area, the rationalization being that neither provides much potential for short-term benefits. In the long run, manioc will be a declining crop as consumer incomes rise. The present slash-and-burn technology practiced in the rice producing areas of Maranhão is not suitable to the kind of program outlined herein.

A time horizon of five years has been contemplated for the recommendations being presented. All of the reforms would begin during the first year in either a research, planning, or action phase since various stages of progress on the recommendations can be observed in the Northeast. The programs would reach a peak in the second or third year and then taper off in the last two years. When the programs begin to taper off, a reassessment of them may be needed to determine which, if any, should be terminated, those to extend beyond the five-year period, and those which may be able to continue without additional public support.

The milk marketing recommendations essentially stand alone. Those programs could be carried forward by the Companhia Industria-

lizacao do Leite do Pernambuco with credit from existing development bank sources.

The Product Marketing System

Conclusions

Product assembly for the four crops considered in this study is usually performed on a low volume basis by large numbers of assemblers. Often as many as one-half of the individuals who purchase from farmers are part-time assembler-farmers or assembler-retailers who collect and sell to somewhat more specialized assemblers. The product may go from an intermediate assembler or broker to a processor (rice, manioc and cotton) or to another intermediary, as in the case of beans. The total number of intermediate transactions in the market channel between farmers and retailers ranged from an average of 2.7 for manioc to 4.4 for rice in Maranhão. Since average gross margins at each assembler level seem to range from 10 to 25%, total marketing costs reflect these multiple transactions.

In spite of the large numbers of assemblers, competition is clearly highly imperfect. This arises largely from imperfect mobility and communication in rural areas. It is also related to a generally accepted attitude that strong competition actually benefits no one. Thus, an attitude of "live and let live" or even open market sharing or collusion is common. Still, there is little evidence of harmful monopolistic practices. Only in the case of cotton, where one firm is fairly dominant, is there any indication of market control by one or a few firms. In general, marketing firms appear not to be making unreasonable profits and are using their limited resources and knowledge relatively efficiently within the constraint of their environment. At the same time, in most areas there is no indication that even a small lead edge of innovative and strongly competitive assemblers exists. In general, market intermediaries are homogeneously traditional in their practices and attitudes. A possible exception exists in rice marketing, where three millers make direct sales to self-service retailers in large lots. This suggests the beginning of a market simplification trend which is likely to continue. A similar phenomenon exists in other commodity markets where itinerant truckers bypass certain assembly levels. In many cases, total marketing costs might be reduced by consolidating the services formerly provided by two or more intermediaries. In many cases this consolidation will require increased capitalization of the channel participants.

The basic flow of market information to rural assemblers and farmers is by word of mouth. That is, participants in the channel ask each other about prices and market conditions in those localities where they have recently traded goods. Assemblers and processors are the vital communication link between farmers and urban area buyers. Normally, price information is disseminated by word of mouth from wholesalers through the various rural intermediaries to farmers. This process takes time and often price information is distorted either intentionally by the intermediary who has something to gain by quoting lower prices or unintentionally through normal communication imperfections (the latter may be likened to the distortions that occur in the spread of a rumor). As a result, prices may be comparatively low in one area on a given day while prices in another nearby rural market are high in comparison to Recife market prices. A few rice and cotton assemblers do use regular radio broadcasts, telegraph and two-way radio communication as sources of market information, but none mentioned telephones. The majority of assemblers depend on other assemblers, wholesalers, or personal market observation for their market information. In most cases, commodity transactions are based on personal inspection of the product. Occasionally, sales are made on the basis of samples among rice traders, but there is no standard grading system to permit specification buying. Assemblers seem to receive quality signals from their buyers, but seldom succeed in transmitting them to farmers. Farmers and assemblers often distrust each other due to previous experience with scale tipping, product adulteration and other dishonest methods. These practices probably often reduce the quality of products offered to consumers, especially in the case of rice and manioc.

Seasonal price variations are most significant for rice and beans. The monthly average farm price of beans showed a 50% variation during 1966. Assemblers and processors provide most of the short-term storage for products flowing out of the rural areas to Recife. Manioc assemblers do not normally store farinha due to its poor keeping qualities. Also, farm storage is not common in most areas. In rice and bean areas, storage is often accompanied by loss and spoilage rates of 1-2% for rice and 3-8% for beans. Farmers most often said they did not store crops due to inadequate working capital and absence of credit or because they had a loan which was due at harvest time. Metal silos, though not widely available, appear to be a fairly low-cost method for storing rice and beans on farms.

The majority of sales between farmers and their buyers take place in small rural villages at the local *feira* or at the assembler's place of business.

Ordinarily, the farmer brings his product into town on horseback, by ox cart or sometimes on his own head. Occasionally, farmers live near a road and either rent truck transportation or have their own vehicles. A few larger producers who live near good roads are able to sell directly at the farm to a local assembler or to an itinerant trucker. This practice is most common among cotton producers. Given the fact that most farmers (56-78%) do not presently live on roads acceptable for truck travel, it is unlikely that the farmers' practice of delivering their products to a local market for sale will be changed in the near future. Nor does it appear that high priority should be given to improving individual farm roads. Much remains to be done on constructing and maintaining the roads linking small market villages with each other and to major convergence centers. First priority should be given to improving those roads which can effectively link villages into the regional economy.

Farmers appear to be relatively responsive to year-to-year price changes. The majority replied that they would respond to the hypothesized price changes by either trying to raise or lower production, depending on the direction of the price change. For all commodities, farmers showed a greater response to the hypothesized price increase than to the decrease. When asked to tell how they would react to a guaranteed price (set at or near market levels but announced before planting time), more than one-third of the producers indicated that they would try to increase the area planted. Bean farmers in the Alagoas-Pernambuco area and manioc farmers showed the least willingness to expand output in response to a guaranteed price.

Recommendations

Price Stabilization Program

a. Expand current minimum price program
b. Improve storage and grading services.

Price instability was found to be one of the major problems in the farm product market. Low, unstable farm prices discourage farm output and investment in new technology. To encourage greater farm output and improved productivity, stable and remunerative price relationships are essential. The Federal minimum price program

coordinated by CFP with the cooperation of the Bank of Brazil is making farm product purchases for storage by CIBRAZEM, and COBAL has just recently begun operating in the Northeast. At the present time, the program is operated on a limited basis with only the Bank of Brazil allowed to make purchases. Other interested banks should also be allowed to make minimum price purchases so as to reach the greatest possible number of producers. This is especially true of any area where there is no branch of the Bank of Brazil.

Since the program is quite new to the Northeast, there is a need for the banks to inform producers of the basic features of the minimum price program. This might be accomplished through radio programs and the local extension agencies.

One cannot state categorically the appropriate price level which should be used in a minimum price program. However, the real average price level in a region for a period of three to five years is a good indicator of the price which should be used. The product price must also be considered relative to the cost of the modern inputs to be used and relative to other farm product prices. The farm price should be high enough to encourage the use of modern farm inputs. At the same time, it must be kept in balance with other farm product prices so as to prevent the occurrence of undesirable changes in the mix of farm output. The present study has shown that farmers are likely to respond positively to slightly higher prices or to be responsive to more stable farm prices by seeking ways to expand farm output.

For these reasons it is probably best to peg the price level slightly below the longer-run real product price level. This will stabilize farm product prices without the danger of creating relative product price imbalances. If additional incentive is needed to encourage the use of modern technologies, it may be most desirable to lower the price of factor inputs. This not only provides the incentive to use the input, but also rewards only those who choose to use the new technology.

Some research is needed to develop more operational commodity grades and standards. Official grades are, for all practical purposes, not used; grading is done on a personal basis. Improved grades and standards are needed to bring about a more effective operation of the price stabilization program.

A study of warehousing in the bean area is also needed to determine the quality and quantity of storage available for the

price stabilization program. This would also determine where new storage is needed as the price stabilization program expands.

Village to Market Center Roads

a. Establish priorities for choosing areas for road development
b. Generate needed financing, possibly through municipal bonds
c. Prepare engineering specifications
d. Begin construction, using volunteer rural labor where possible.

Inexpensive village to market center roads are needed to facilitate transportation of goods into and out of the areas. These roads should be graded dirt or gravel that would allow for year-round access to the area. It is suggested that communities attempt to raise the money themselves through sales of municipal bonds with low interest rates and long payback periods. The farmer surveys indicated that the overwhelming majority of farmers would be willing to donate some of their labor toward improving roads in their areas. This free labor could reduce construction costs significantly if used effectively.

First priority in major production areas would be given to linking up each county seat to the market center roads. This might be followed by a program to connect small villages to the county seat with improved roads.

Road construction would utilize primarily hand labor, with engineers supervising construction. Shovels, culverts, and a few trucks would provide most of the basic materials needed.

Market Information Program - Recife is presently being linked up with a market information system serving major cities in southern Brazil. Quantity and price information for the basic food commodities will be exchanged between Recife and the major cities in the South. It is assumed that this program will be completed. However, Recife does not have effective market information linkages with interior towns in producing centers.

The recommended program would transmit market information from Recife to the interior towns, where it could be broadcast on local radio and disseminated in rural *feiras* using mobile public address units. Prices and volumes traded in convergence centers would then be transmitted back to Recife, where buyers could get the information.

The first phase of this program would concentrate on selecting the convergence centers and getting the equipment purchased and operating. Technicians would have to be trained to operate radios and to collect the information needed. The program could probably begin operation in the second year.

The Agricultural Input Marketing System

Conclusions

In general, production methods remain quite primitive for the five commodities considered. Few improved crop varieties have been developed. Most cultivating is done by hoe or by ox and plow, and harvesting methods are primitive. Only in the bean area of Irecê, Bahia, and in rice production along the lower São Francisco River is there any significant use of tractors. Plant spacing remains traditional and inefficient, with a good bit of random interplanting of corn and beans in all surveyed areas and of rice and beans in Maranhão. The majority of farmers try to select the best of their production for seed or purchase selected seed. But few, if any, improved varieties are even available for use. Insecticides are used by a relatively high percentage of farmers. Chemical fertilizers are not used in any area except in the lower São Francisco River Valley, where 12% of the farmers said they applied it. Moreover, almost half of all farmers were not even sure if they knew what chemical fertilizers were. Of those who did, their attitudes toward fertilizer use seemed to be that it is difficult and complicated to use, too expensive to be profitable, or not practical due to credit limitations. Several believed their neighbors thought it was foolish to use fertilizer. These appear to be the types of difficulties or objections which must be overcome in order to speed adoption and use of chemical fertilizers.

It was found that in most of the survey areas, modern farm inputs such as fertilizer, tractors, pesticides and improved seed were not available in local trading centers. It would, therefore, seem that there is a close correlation between use of purchased farm inputs and availability in local village markets. No chemical fertilizer distribution system appears to exist in the areas studied; since few improved varieties exist, there is no well-developed seed distribution system. Tractors and other machinery are sold or rented only in the Irecê and São Francisco areas. This does not prove causality, only interrelationships between

input availability and use. A review of price relationships between inputs and products suggests that these inputs may not be profitable under current farm practices. The limited market distribution of such inputs in the Northeast is partly responsible for high input prices, since production facilities are not fully utilized and low volume distributors must spread the burden of fixed marketing costs over the relatively few units sold. The solution to this dilemma involves efforts to inform producers of the potential benefits of modern farm inputs and to encourage the development of more low cost input distributors. At the same time, credit which can be used for the purchase of modern inputs must be made available. About one-half of the farmers interviewed in the survey used some type of credit in 1966. The most common sources were government banks at an average subsidized interest rate of about 1% per month. Moneylenders, including assemblers and assembler-retailers, were an important source of credit for the very small farmers in all commodities. They usually charge an interest rate of 4 to 5% per month. In addition, these assembler-creditors frequently require the farmer to sell his product to them early in the marketing season at very low prices. As an indication of the present demand for credit, over 88% of all farmers indicated an interest in borrowing more money if it were available at a rate of 20% per year (which is still less than the recent rates of inflation). The average amount of credit which they would accept at this 20% annual interest rate ranged from NCr$1,168 for manioc farmers to NCr$7,360 for São Francisco rice producers.

It was noted earlier that most farmers in the survey obtained the majority of their incomes from the sale of their major products. It was also noted that those sales were usually made in a nearby village. It seems that, on the average, farmers travel not more than 20 kilometers once a week to a local *feira* where products are sold and food, non-food consumer goods, and farm inputs are purchased. The distance is usually traveled on foot, on horseback or by ox cart. In spite of the fact that most farmers produce a good bit of food for home consumption, manioc, bean, and cotton farmers spend from 65 to 75% of their incomes on food. However, 68% of all farmers interviewed had sewing machines and 59% had radios. Thus, farmers spend a good portion of their incomes on basic consumption goods. The survey also indicates that with rising incomes farmers would tend first to increase consumption expenditures and later to increase investment of input

expenditures. This suggests, first, that farmers are well aware of consumer good purchase alternatives and anxious to have more such products and, second, that the farmer's first impulse is not to purchase farm inputs with his scarce income. Thus, credit for modern farm input purchases is a necessity if new technologies are to be adopted.

Recommendations

Seed Improvement Program

a. Multiplication and distribution of present varieties
b. Development of improved varieties
c. Multiplication and distribution of improved varieties.

A modern agriculture requires high-yielding, disease-resistant crop varieties which are highly responsive to fertilization. Such varieties did not seem to be used on Northeast Brazil farms in 1966. The first phase of this program would be to create an institution to collect and multiply the best strains of currently available varieties for immediate distribution. This would provide producers with somewhat improved seeds while permitting research on seed improvement to get under way. It would also serve to begin development of a multiplication and distribution system for the improved seeds to be developed by researchers.

A non-profit foundation or government-sponsored seedhouse might be developed that would turn varieties over to commercial firms as they become ready for commercial multiplication and distribution. Area dealerships might be used to develop the rural distribution system for seeds once large quantities are available for commercial distribution. Farm supply cooperatives could also be used for seed distribution.

A top quality plant genetics staff is needed to develop improved varieties of crops. These geneticists would be responsible for developing higher-yielding, disease-resistant varieties that would have acceptability in the Northeast. The program might begin by collecting and testing large numbers of domestic and foreign varieties. The Rockefeller Foundation's Wheat and Corn Center in Mexico has developed improved varieties of corn and beans which have been used successfully in Mexico to increase yields. The International Rice Research Institute in the Philippines has developed some high-yielding rice varieties which may be adaptable to Northeast Brazil. Samples of these varieties should be tested under field conditions in the Northeast. If successful, larger

quantities should be purchased for multiplication and distribution in rural areas. Once varieties are developed and field tested, they can be turned over by the Foundation seedhouse to commercial multiplication and distribution firms.

Fertilizer Response Program

a. Fertilizer response research
b. Fertilizer demonstration
c. Fertilizer distribution.

The responsiveness of traditional varieties and of new varieties as they are developed to varying levels of fertilizer use must be determined. Since soil conditions vary widely and rainfall patterns are uneven in the Northeast, a large number of research plots will be needed in major crop producing areas. The importance of water and fertilizer response information is critical in the Northeast. The research objective is to determine the optimum level of fertilizer use. Once the optimum levels of fertilizer use are approximately determined, a large demonstration program should be carried out in the crop production areas. The ANCAR extension agency and local Ministry of Agriculture representatives should be used to carry out these tests under field conditions. Fertilizer companies in Recife should be encouraged to support the program by supplying the fertilizer needed at reduced prices. Profertil, the largest fertilizer company in the Northeast, is already cooperating on a similar project in Pernambuco involving the Federation of Cooperatives and the Peace Corps. The insecticide companies (Shell, etc.) should be encouraged to supply the insecticides needed on these same demonstration plots so that any complementarity from the use of these inputs is achieved. Improved seeds from the Foundation seedhouse should also be used.

A promotional campaign using radios, billboards, displays in rural *feiras*, etc., should be launched to promote the awareness and profitability of using these new technologies. Producers should be informed of where these demonstration plots are located so that interest can be cultivated by actual observation of the results under field conditions.

Fertilizer could be distributed through three channels. One might be through the Federation of Cooperatives in areas where good cooperatives exist. Because cooperatives deal only with their members, other channels of distribution are needed in all areas. Probably the most effective channel would be the creation of franchised

dealers in the major production areas. The market development costs of these dealers could be underwritten by the fertilizer companies through a government loan which the companies would receive for this purpose. The third channel might be the local ANCAR extension offices which would handle reserve stocks for sale only when the input packages might be unavailable from other sources. The ANCAR offices should charge slightly higher prices so as to encourage the growth and development of viable commercial sales outlets. ANCAR distribution is desirable only to ensure the likelihood that fertilizer will be available at any time.

Fertilizer Pricing Program

a. Remove circulation tax
b. Determine subsidy needs

The incidence of using fertilizer can be increased through elimination of the 18% ICM (circulation tax). Improving the relative prices of the inputs used and the products produced is needed to provide the necessary incentives for the initial phase of the program. At the present time, such a tax is a dis-incentive on the use of new technology. In addition, elimination of the tax would mean only a small loss in revenue to the government, since sales of these inputs are very low at the present time. The loss in revenue could be easily offset by the additional revenues resulting from increased food production.

It is probable that further price reductions are needed before widespread use of fertilizer becomes possible. This could be accomplished through a subsidy to the fertilizer companies (including imported fertilizer which is in world surplus and maybe below local cost) which would allow them to lower the selling price. The amount of the subsidy would have to be determined after careful study of the fertilizer response research and fertilizer-product price relationships. In addition, it may be desirable to increase short-run profitability slightly above "normal profit levels" to hasten the initial adoption rate so as to get the program off to a good start.

Input Credit Program

a. Review current credit policies and study the need for additional farm credit
b. Begin semi-supervised credit.

Additional credit may be needed to help farmers finance the cost of buying the seeds, fertilizers and insecticides. The Bank of Brazil's current loan regulations place a fairly low limit on the amount of money which can be borrowed for each hectare that is planted. This limit needs to be raised to allow for the increased cost of purchasing modern inputs. The Funfertil program for financing fertilizer use should be utilized to help fill credit needs. Rural banks, fertilizer distributors and rural extension agents should be informed of the program so that they can assist farmers in obtaining loans under the program. The Bank of Brazil and the dispersing agent for any new lines of farm credit should consider the possibility of making large loans to input distributors, who would then be required to pass the credit along to farmers for purchase of inputs at specified interest rates. Input sales may be enhanced if the distributor can also finance the purchase. It is more convenient for the buyer and may involve less red tape. Loans to small farmers capable of using the input package might also be handled through cooperatives and through private banks.

Some credit supervision may be needed to assist producers in the proper management and use of these new technologies. Banks will need well-trained agents to perform this function, possibly in connection with the ANCAR extension offices. Since knowledge and literacy levels are low, this credit supervision may be an extremely important part of the program.

The Milk Marketing System

Conclusions

A special study was focused on the production and marketing of milk processed and distributed in Recife by a mixed economy pasteurizing firm (CILPE).

The CILPE processing plant, which was remodeled in 1960-61, has been operating at about 50% of the capacity of all major facilities, with the exception of bottled milk storage capacity, where available space is already being utilized completely. There is a great potential demand for fresh milk in Recife. It is estimated that only about 30% of the total consumption of milk in Recife is fresh milk. The largest proportion is powdered milk which is imported from southern Brazil. An apparent reason for low consumption of fresh pasteurized milk is CILPE's highly conservative operational policy of avoiding possible surplus milk situations. This has produced a conscious policy of rationing to distributors

during periods of low supply and has created a consumer image of uncertainty of availability. Low consumption of CILPE milk also stems from the fact that due to poor handling practices and lack of refrigeration in collection and distribution, the quality of the company's milk has often been unsatisfactory to Recife consumers. The consumer survey in Recife showed that the most frequently mentioned reasons for not buying CILPE's milk were supply uncertainty and expected low quality. Programs to alleviate these two problems and change consumer opinions about the company's pasteurized milk could produce a rapid increase in fresh milk consumption in Recife, which would produce important benefits to consumers (lower milk prices), to CILPE (greater plant utilization) and to milk producers (greater product demand).

It was found that the milk producers marketing through CILPE sold an average of 63 liters per day in 1966. Production methods are simple. Producers usually have mixed blood Holstein and Zebu herds. The calf is permitted to take all the milk he wants during the day. Milking is performed by hand only once a day on most farms. Milk is handled without much concern for sanitation on the farm, and refrigeration is seldom used. The average daily production per cow was about 4 liters. This can be related to the fact that the basic ration is grass, supplemented by cotton seed meal during the dry season.

The farmer's milk is picked up at his farm each morning and delivered to a local CILPE collection post still unrefrigerated. There it is tested and rejected or accepted at a lower price if found acid. No other quality standards are used nor are farmers given any incentive for delivering high quality milk. At the post, the milk is strained, refrigerated and either returned to milk cans or stored in an insulated tank at 2 out of 9 posts. The canned milk is then transported to Recife in an open truck and the bulk milk is hauled in an insulated tank truck. In Recife, the milk is pasteurized and delivered to distribution posts within 12 hours.

Recommendations

Most of the suggestions for improving the milk marketing system could be implemented by CILPE with possible loan assistance from the Bank of Brazil or the Bank of the Northeast or a state development bank. The recommendations will be listed in order of priority and discussed briefly.

1. Purchase bulk storage and transport equipment for collection system.

Tables 10.1 and 10.2 show a comparison between the cost of transporting 36,000 liters per day by bulk tank and in cans. These cost estimates were derived after making the following assumptions:

a. CILPE will continue to haul 14,000 liters per day from Pesqueira in the PLAMAN tank truck. (This was not included in the cost estimates.)

b. The two small posts at Bezerros and Belo Jardim would be eliminated.

c. Included in the calculations was the cost of purchasing five 10,000 liter insulated tanks for location at the remaining posts not having bulk storage facilities.

d. The cost of three additional tanks and trucks with a capacity of 14,000 liters each day is included.

The difference in the cost of transportation in bulk and in cans is somewhat surprising. Assuming an average daily volume of 36,000 liters, the bulk storage and transport system has a daily cost of NCr$633.00 compared to the total daily cost of NCr$1,043.00 for shipment in cans. This yields a savings of NCr$410.00 per day. The bulk system could pay for itself out of transport savings in less than two years. Moreover, as the average daily volume goes up, the comparative liter cost differences would be even more in favor of bulk transportation. This is due to the fact that the hypothesized storage system has a capacity of 90,000 liters. The only major cost of expanding from 50,000 up to 90,000 liters per day would be the tank truck purchase and operation costs. On the other hand, volume expansion using transportation in cans would require a proportional increase in cost for every item on the list. The bulk system thus has significant scale economies.

2. Develop procedures for more accurate tests of milk quality at collection posts, upgrade quality requirements and establish price incentives for high quality of milk.

The results of the dairy farmer survey indicated that CILPE suppliers as a whole do not follow careful sanitation practices. The present CILPE practice is to determine whether or not the milk is acid when it arrives at the collection post. Thus, milk in which the fermentation process is under way but not yet to the point of acidity is presently accepted and mixed with other milk at the post. The shift to bulk handling should be accompanied by a change to higher quality requirements. Some combination of a more definitive acidity test, a sediment test, and a specific

Table 10.1 Cost of Transporting an Assumed Daily Volume of 36,000 Liters from Present CILPE Posts to Recife Plant by Flat Bed Trucks (Capacity 100 cans of 55 liters)

Transport payments to private truck owners (rate per trip varies according to distance)	NCr$	589.00
Workers to maintain post and to load and unload trucks at the posts (21 men at NCr$6.00 per day)		126.00
Unloading costs at plant (8 men at NCr$6.00 per day)		48.00
Loss in transit (1% x 36,000) (1 x .24)		86.00
Cost of cans (1,400 cans at NCr$38.00 per can replaced every nine months		194.00
Total cost per day		NCr$1,043.00

Table 10.2 Cost of Transporting an Assumed Daily Volume of 36,000 Liters from Present CILPE Posts to Recife Plant by Three Bulk Tank Trucks (Capacity 14,000 liters each)

Depreciation (over 4 years) and interest (2-year loan at 24% per year) for three trucks and tanks	NCr$	193.00
Fuel, oil, lubrication, tires, maintenance, etc. (1,170 km at NCr$.15 per km)		175.00
Workers to maintain post, load and unload trucks (2 men per post = 14 at NCr$6.00 per day		84.00
Drivers (4 men at NCr$8.00 per day)		32.00
Unloading costs at the plant (1 man at NCr$6.00 per day)		6.00
Tanks for storage at posts (5 tanks at NCr$12,818.00 per tank - 4-year depreciation)		44.00
Storage tank maintenance		4.00
Milk cans from farm collection and delivery to posts (700 cans at NCr$38.00 per can every nine months)		97.00
Total cost per day	NCr$	633.00

gravity test might be used in establishing appropriate criteria for judging product quality.

3. Reorganize the wholesale distribution system to add five delivery trucks immediately and study the possibility of purchasing insulated delivery equipment.

CILPE is already moving in the direction of reorganizing its distribution system in order to add more delivery trucks and cut down on the average length of delivery routes. It is suggested that this reorganization be completed as soon as possible. However, since the company has limited refrigerated storage capacity for bottled milk, it is suggested that the company explore the possibility of purchasing insulated delivery equipment. Such equipment would permit the company to further reduce exposure of its milk to high temperatures and would help alleviate the bottled storage problem since the vehicles could serve as overnight storage space.

4. Re-evaluate present distribution posts and move toward more and larger sales outlets.

At the present time, CILPE delivers milk to 377 distribution centers. Some of those sell as little as 20 liters per day, with the most common sales ranging from 50 to 120 liters per day. It is suggested that the company review carefully its present system of distributors and make special efforts to establish distribution through additional potentially high volume distributors while removing some of the smaller posts from its routes.

5. Survey all self-service retailers in the city to determine how many would handle CILPE milk in disposable cartons.

Several self-service retailers have indicated an interest in handling CILPE milk in disposable cartons with guaranteed milk quality. Other parts of this report have indicated that large volume self-service retailers are likely to capture a growing share of good sales in Recife. These stores should have a great potential as milk distributors if they can be convinced to handle a high quality product in a convenient container.

6. Hire a competent advertising firm to direct an intensive campaign to improve the consumer image of CILPE milk.

The survey of Recife consumers indicated that many families do not buy CILPE milk because of a prevailing belief that it is not healthful or because of difficulties in obtaining regular supplies. The foregoing recommendations are aimed toward overcoming those two

problems. It is therefore recommended that, after having instituted certain basic quality and distribution improvements, the company should launch a broad campaign to inform the consumers of those improvements. The success of the company's present advertising program indicates that such a campaign could expand sales significantly.

Towards a Systems View of the Market Process

Chapters 3 through 10 have described and analyzed various components of the agricultural production and marketing system in the Recife area. The urban food marketing components were subjected to careful scrutiny as a basis for the diagnosis of deficiencies and the formulation of a related set of recommendations. Likewise, we have examined and made recommendations for the rural components of the system. We now turn to a more comprehensive level of description and analysis. Chapter 11 presents a systems model of the Recife foodshed economy which permits us to examine some of the complex interrelationships among the various components of the system. Later, in Chapter 13, this model is used to simulate the possible impact of selected recommendations for marketing reforms.

CHAPTER 11

THE RECIFE SYSTEMS MODEL

Introduction

The Purpose and Objectives

This chapter presents a description of a general systems model of the marketing system of Recife, Brazil, and the four surrounding states which comprise Recife's primary "foodshed." The model is called the Recife Systems Model. The fundamental purpose of the modeling effort was to provide for the decision-maker responsible for development planning a framework for the assessment, through computer simulation, of the economic consequences of alternative investment programs in the coordination of market processes of the area.

There are three other objectives of this modeling effort. As a methodological exercise, the model is intended to improve the understanding of the technical problems and benefits of utilizing computerized systems models in the planning process. As a research aid, the model provided a framework for field research planning by assisting the researchers in developing operational hypotheses, explicit information needs, and integrated analysis of results. As a training device, the process of building, correcting, and applying this model demonstrated the ability of the model to assist SUDENE personnel in understanding the economic system, in coordinating their planning efforts by improving communications between planning groups, and in advancing their working knowledge of advanced management planning techniques.

The Background

This application of general systems analysis and computer simulation to market process study was the result of two interrelated factors: first, the increasing concern about the interactive and dynamic consequences of market changes in developing communities; and second, the developing skill in the application of general systems modeling techniques to socio-economic problem analysis.

Chapter 1 outlined the growing awareness among development planners and scholars that the coordination of market processes, especially between rural and urban areas, plays an important role in facilitating and stimulating economic development. The results of the research work done in Puerto Rico by Michigan State University research staff supported the initial hypothesis that marketing

functions and institutions could play a significant role in stimulating change both in consumption and supply characteristics. Further, it became evident that, while the assessment of the first order impact of market changes was relatively easy, the second order effect between sectors in the economy and third order effects over time were much less apparent. In order to understand the complex process of market coordination and to justify investment in market-oriented reforms, it was evident that these second and third order effects should be determined. Without an analytic planning tool which permitted this type of interactive analysis, the ability to understand and accurately predict the implications of market process changes would be extremely limited.

During recent years the Systems Science Group at Michigan State University has carried forward a major investigation to transfer the technology of systems analysis developed for the physical sciences to new applications in social and economic problem areas.[1] Of the many potential modeling efforts appraised, systems analysis methodology seemed to offer the type of analytic capability necessary to form a base for systematic organization of economic information and to analyze complex and dynamic systems.[2,3,4,5,6]

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[1]There are many books and articles on the theory of system analysis. Two sources are suggested. For the highly technical analysis of the theory, see: Herman Koenig, *et al., Analysis of Discrete Physical Systems* (New York: McGraw-Hill, 1966). For an excellent qualitative description of the meaning and structure of system analysis, see: John Griggs, "Evaluating the Consequences of Marketing Change: An Application of System Theory" (Unpublished Ph.D. dissertation, Michigan State University, 1968), Chapter IV.

[2]Edward P. Holland and R.W. Gillespie, *Experiments on a Simulated Underdeveloped Economy* (Cambridge, MIT Press, 1963) and Edward P. Holland, "Simulation of an Economy with Development and Trade Problems," *American Economic Review* 52: 408-430, 1962. Simulmatics Corporation, *Dynamic Models for Simulating the Venezuelan Economy* (Cambridge: The Simulmatics Corporation, 1966).

[3]Richard Stone, *A Programme for Growth-3 Input-Output Relationships* (Cambridge: The MIT Press, 1962).

[4]James S. Duesenberry, *et al., The Bookings Quarterly Economic Model of the United States* (Chicago: Rand McNally and Company, 1965). See also: L.R. Klein, "The Social Science Research Council Econometric Model of the United States," *Econometric Analysis for National Economic Planning* (London: Butterworths, 1964), pp. 129-169.

[5]Thomas J. Manetsch, "Simulation and Systems Analysis of the U.S. Softwood Plywood Industry," (Unpublished Ph.D. dissertation, Oregon State University, 1964).

To test the feasibility of using systems analysis as a tool to improve the understanding of market processes, a relatively small, aggregated model of Puerto Rico was developed.[7] Combining other modeling techniques such as input/output analysis and national income models, Griggs developed a systems analysis framework with explicit distribution functions. The purpose of the model was to analyze the employment-income effects of changes in market processes.

Building on the Puerto Rican Model, the Recife Systems Model is a second generation model more closely linked to primary research information and of a scale sufficiently large and disaggregated to allow more planner-oriented analysis of specific market reforms and their consequences.[8] Thus, the Recife Systems Model is the first large-scale quantitative modeling effort directly linked to a survey research effort and serving as a guide for the research and, in turn, receiving the information necessary to structure and use the model.

In this chapter the Recife Systems Model is described and the ways in which this model can be used are outlined. First, the general structure of the model is presented, followed by a detailed description of each of the sectors in the model. Finally, the six steps necessary to use the model are discussed.

A general knowledge of the operation of the model and of its functional relationships and parameter estimates is required for critical appraisal of the model and its results. The present description is written to facilitate critical appraisal by stressing the structure, flexibility and assumptions of the model. It is an abbreviated and simplified version of the full description and analysis of the model found in "A Systems Model for Market Development Planning: Northeast Brazil," a doctoral dissertation by Thomas R. Webb.

Readers not concerned with the technical aspects of the model appraisals may wish to omit the following two sections from their first reading of this report. They may wish to skip to the section headed "Using the Model--A General Description."

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[6] Herman E. Koenig, *et al.*, "State-Space Models of Educational Institutions," Organization for Economic Cooperation and Development, Proceedings of the Second International Conference, Paris, January 25-27, 1967.

[7] John E. Griggs, *Evaluating the Consequences of Marketing Change: An Application of Systems Theory* (Unpublished Ph.D. dissertation, Michigan State University, 1968).

[8] *Ibid.*, pp. 180-84.

For the reader interested in the more technical appraisal of the model and its structure, the following sections will provide an effective overview. Appendix B contains a more detailed analysis of the model.

The General Structure of the Model

The Recife Systems Model is an economic planning model of a regional sub-sector of Northeast Brazil. The following description of the model is divided into two major categories. The first is the description of the internal economic structure of the model. The second is a discussion of the planner-oriented characteristics of the model.

The Internal Economic Structure - The internal economic structure of the model contains basic accounting identity relationships, behavioral assumptions central to the analysis of market reforms, and other relationships necessary to facilitate the analysis of the market-oriented reform programs.

There are two distinct levels in the internal economic structure of the model. The first level consists of defining the basic internal economic system via a graphic description of the economy. This includes defining the boundaries of the system, determining which sectors to include and the components within sectors considered important, and the inter-sector flows of goods and services which link sectors within the system. Thus, this first level is a simple map or topography of the economic system which defines basic "accounting identities." An example of this type of identity would be taking the flow of income to a consumer group, splitting that flow according to average propensities between food, consumer goods, and other expenditures and savings, then splitting food expenditures by location of purchase.

The second level of the internal economic structure is the set of behavioral assumptions which make the economic system act as it does. The factors determining output of industry classes, the relationship between consumer prices and consumer location of purchase are examples of important relationships to consider. A wide variety of relationships could be developed, each with varying degrees of complexity. It is important to stress those relationships most relevant to the particular problems under analysis. For the Recife model, market process analysis is the central concern; thus, emphasis is on margin, spoilage, purchase behavior and food production rather than on production functions for capital goods industries.

If the model is to be oriented to planner use, it is important to permit the user of the model wide latitude in determining the magnitude and content of behavioral relationships. The user of the model may want to test the effect of a program under a variety of hypothesized behavioral reactions to the change. And, when evaluating different policy programs, the user may want to stress the importance of different behavioral relationships. What variables are included in a given relationship and the accuracy demanded from that relationship vary, then, with the kind of analysis undertaken and the nature of results desired. For example, if a reform program centers on changes in food distribution, the accuracy of production functions for consumer goods is much less important than if the market reforms were consumer goods oriented.

Therefore, instead of rigidly defining all of the behavioral assumptions, the internal structure of the model provides a flexible structure to the user. This flexible structure permits the user to easily change the degree of relationship between variables, to add other variables to a relationship perceived important in the analysis of particular programs or reform situations, or to build entirely new relationships.

For example, in the determination of food production, special modern and traditional producers are defined with a very simple transition relationship between the two that moves land from traditional to modern production. But the extent to which the switching would take place as a function of such variables as fertilizer availability and output prices is left open for the user of the model to define.

The next section briefly outlines how the user of the model can alter the behavioral assumptions of the model through the use of planner entry routines (PERs).

Planning-Oriented Characteristics of the Model - The planning-oriented aspects of the Recife Systems Model can also be classified into two rather distinct levels. The first is the user's ability to change or refine the behavioral assumptions within the internal structure relative to his particular analysis requirements. The second is the manner in which the planner controls or influences the behavior of the system through the use of available policy tools.

As stated in the previous section, the internal structure of the model is built to allow the user to refine, add to, or change many of the behavioral relationships assumed in the internal structure. The flexibility retained in the internal structure places an added burden on the user of the model. He must decide the final

composition of the behavioral characteristics of the economic system. In order to facilitate this process, planner entry routines are developed which are clustered around the internal economic structure of the model. These routines are the focal point of planner interaction with the model. Most data inputs required by the internal structure of the model can be determined in the planner entry routines; thus, they offer to the user the ability to vary a wide range of behavioral and structural conditions in the system. For example, the labor demanded by a particular industry type is a function only of output in the internal structure. It is structured, however, to permit the user to expand that relationship to include a variable such as level of capacity utilization. This relationship would be developed in a PER as an input to the internal structure of the model. Any number of PERs can be built and attached to the core structure in this way.

In the present model, two PERs are developed--Decision Routine-Consumer I and Decision Routine-Capital II. The purpose of both routines is to allocate any short-run differences between local supply and demand according to a predefined set of decision rules. Consumer I allocates supply and demand differences between the industry and rural sectors and the urban distribution sector for food and consumer goods; Capital II handles supply and demand differences for capital equipment, farm inputs, and construction materials--all investment-oriented goods.

The second level of planner orientation is in control (control in the sense of a means to guide or influence the behavior of a system). Given the economic behavior of the system, the planner must relate the tools at his disposal, policy variables such as taxes, credit, investment incentives, or technical assistance, to their impact on the economic behavior of the system. Planner entry routines are also used to develop this link between policy variables and economic behavior. An investment sector is included in the model to provide the framework in which these important relationships can be structured.

Thus, by utilizing PERs already developed or by building other planner entry routines, the planner can assess the impact of various economic assumptions or evaluate the effect of different hypothesized policy programs on the behavior of the system over time.

With this brief introduction to the nature of the Recife Systems Model structure, the internal economic structure of the model is described first in general and then sector by sector, followed by

an analysis of the planner entry routines and how they affect the structure and use of the model.

The Internal Structure of the Model

The System

Defining the System - The boundaries of the economic system included in the Recife Systems Model are defined along geographic lines--the urban center of Recife and the four states immediately around Recife (Pernambuco, Alagoas, Sergipe, and Paraiba). The metropolitan area of the county of Recife, with a population of about 1.5 million people, is the largest urban concentration in the Northeast, and it is the major "supply town" for the four surrounding states for both locally produced goods and imports. The rural area has a population of approximately nine million people, with two-thirds living on farms and the remainder in cities and small towns in the region. This rural area is the primary supplier of staple food items to Recife. Any larger rural area would have forced the inclusion of another large metropolitan area--Salvador in Bahia to the south and Fortaleza in Ceará to the north.

The internal structure of the model focuses on the economic exchange relationships between Recife and its foodshed. The rural area supplies Recife with food, raw materials, and some consumer goods for urban industry, distribution, and final consumption. In turn, the urban center provides the rural area with consumer goods, processed food, and agricultural supplies and equipment from its industrial and distribution base, as well as financial and logistical support. Import and export sectors link the defined economic system to other parts of the Northeast, to the Center-South and the rest of Brazil, and to international markets. Most importation and exportation go through the port of Recife or a few major assembly markets near Recife. The inclusion of import and export sectors is extremely important, because a significant amount of regional income is generated in the export of commodities such as sugar and cotton; and, on the other side, the region is dependent on the Center-South of Brazil for some food products, much of its consumer goods, and almost all of its capital equipment.

Defining the Sectors - The basic unit in the internal structure of the model is the "sector." There are many potential ways in which the system can be broken down into sectors. The defined sectors in the Recife Systems Model are built relative to the major

problems to which the model is oriented, the data base which is available, and the limits of mathematical flexibility.

The primary economic sectors in the model are the consumption-income sector, the distribution sector, the industry sector, and the rural sector. These sectors form the central economic structure of the model. They are the sectors included in the most detail and those for which reforms are simulated and major impacts are measured. Because of the importance of importation and exportation, an import sector and an export sector are defined. In order to "round out" the structure of the system, a conglomerate "other Recife" sector is built in order to facilitate the analysis of the interactive and dynamic effects of selected reform alternatives on the total system. These various sectors are further described below:

1. Recife Consumption-Income Sector. This sector represents the urban Recife consumers--their income and expenditure patterns.

2. The Recife Distribution Sector. Urban wholesale and retail distribution to final urban consumption are included in this sector.

3. The Recife Industry Sector. This sector represents all manufacturing and processing done in the urban Recife area.

4. The Rural Sector, the largest sector, is a composite of the four-state area around Recife including the production and distribution of food and non-food products; final farm consumption of food, consumer goods, and agricultural farm inputs; and final non-farm consumption in the smaller urban centers of the region.

5. The Other Recife Sector. This sector contains all economic activity not explicitly defined in the other primary urban sectors. It includes such activities as government, services, and transportation.

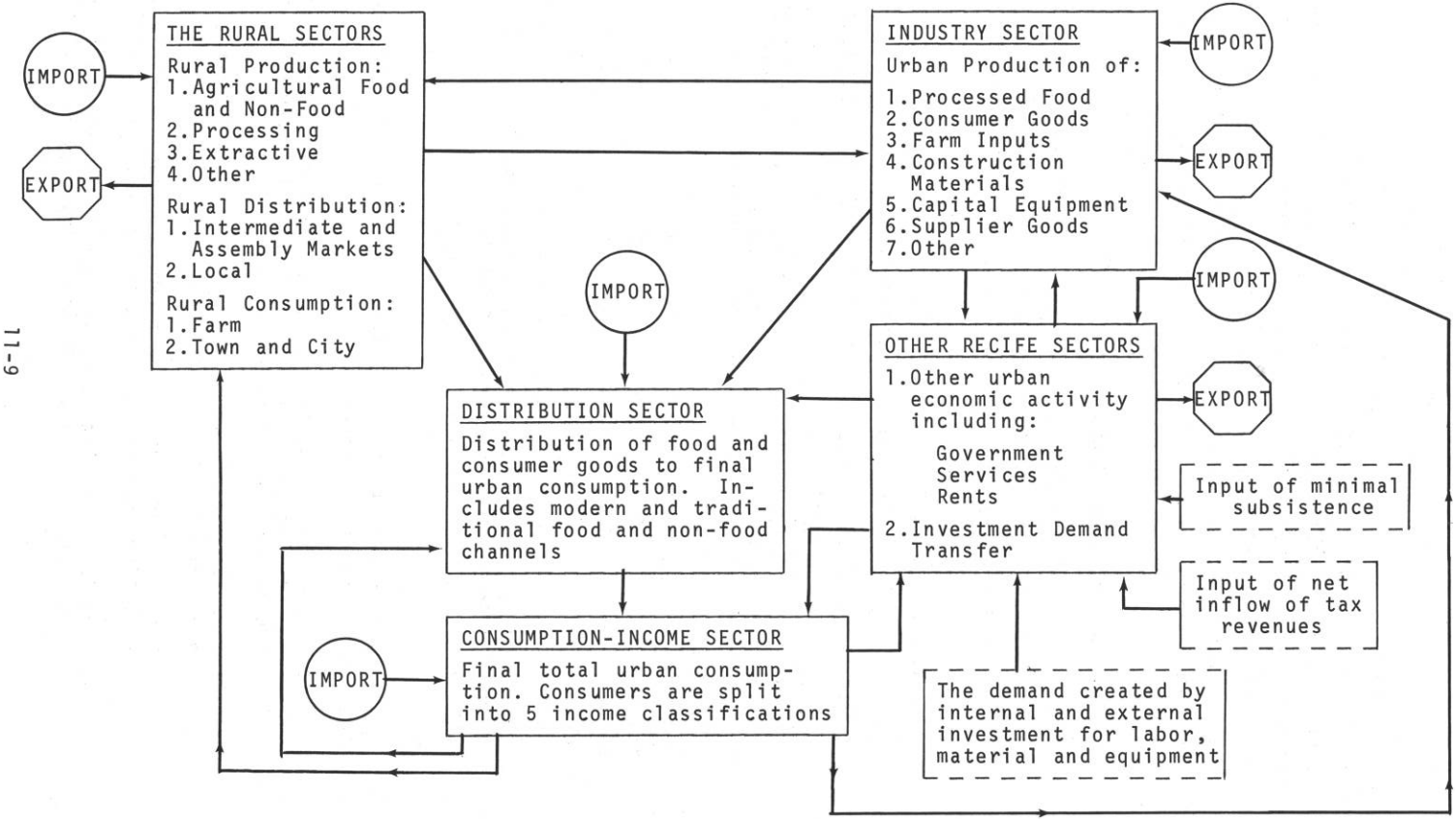
The Mapping of Flows - Figure 11.1 shows the interconnection pattern between all sectors in the model. The lines (edges) represent the flow of a vector of a group of goods between the economic sectors. Each flow is an input to some sector and an output of another. Criteria for the inclusion of a flow edge between any two sectors were:

1. Is there a significant flow in the current system?

2. Is it likely that there will be a significant flow in the future?

3. Would any of the reform options or othe hypothesized changes in the system warrant the use or development of a flow between sectors?

Figure 11.1 The General Model Structure--Inter-Sector Flows
The Recife Systems Model



With this map of the system, the "structure" of the model is defined. Within each of the sectors, further breakdowns into components are incorporated to differentiate significant "behavioral differences," but in all cases the relationships must be in terms of the interfaces or terminals of the sectors, i.e., where they connect to other sectors. Now each sector in the model is presented in more detail, followed by an explanation of the planner entry routines.

The Consumption-Income Sector

The consumption sector is a major fulcrum for the Recife Systems Model. This sector is composed of five subclassifications of the consumers divided by level of income as shown in Table 11.1.

Table 11.1 Definition of Consumer Classifications

Income Class	Average Family Income US$/Yr	% of Family	% of Total Consumer Income Generated	Average Propensity to Consume Food[a]
Very high	15,000	1	11	9.1
High	9,500	2	11	14.9
Middle	3,700	25	48	36.9
Low	1,000	47	25	59.6
Very low	350	25	5	89.

[a]Defined as the average percentage of disposable income spent on food by each income class of consumers.

SOURCE: Tables 4.1 and 4.2 of this report.

Income to each of these consumer types is generated from five potential sources in the model:

1. From rural income coming to Recife and income generated from the movement of rurally produced commodities flowing through Recife to export.
2. From the distribution sector in the form of direct labor wages and distributed profits.
3. From the industry sector as direct labor wages in distribution and manufacturing and distributed profits.
4. From the other Recife sector for wages generated in government, construction, and other wage sources (such

as services) and non-wage income (such as net rents, dividends, and interest payments).

The "Open" or "Quasi-Closed" System - In the Recife Systems Model it is possible to assume either that the total rate of income generation for each consumer type is exogenously given to the consumption sector or that it is derived internally from the income generated from the other sectors in the model. The first assumes an "open" system and the second assumes a "quasi-closed" system.

Using the model in an open sense permits exogenous determination of demand and the level of income generated from that demand level. This exposes any wide disparities that arise between expenditures and income generated by the system for that given level of demand. Further, it demonstrates the level of demand necessary to "support" the productive system at a given level under current technical and structural relationships.

In this model, a simultaneous solution is not used when the model is "closed." The system is closed through the sequential generation of income from time period to time period. This process is called "quasi-closed" (see Appendix B). The initial income is assumed to represent the income at the beginning of the time period and, as changes take place within the system (in such things as price, shopping behavior, etc.) during the given time period, a new income "rate" is generated. The rate at the end of the time period becomes the initial income rate for the next time period. At best this is an average, but so, too, is that developed in a simultaneous solution. Under the simultaneous solution, the rate is the average over the time period.

Using the model as "quasi-closed" permits analysis of the multiplier effect of changes in the system in one time period and their repercussions through time. In measuring the effects of some of the reform options introduced into the model, this will be an important consideration. But when the model is closed, it becomes more important to have all income sources well defined and have accurate estimates of parameters splitting the income flow between each source of income and each receiving consumer type.

The Structural Relationships--Expenditure Patterns - Given the income to each consumer type, either exogenous to the model or from the solution of the rate of income generation within the model, expenditure patterns are developed for each type. The final result is the level of expenditures by each consumer type in the following categories:

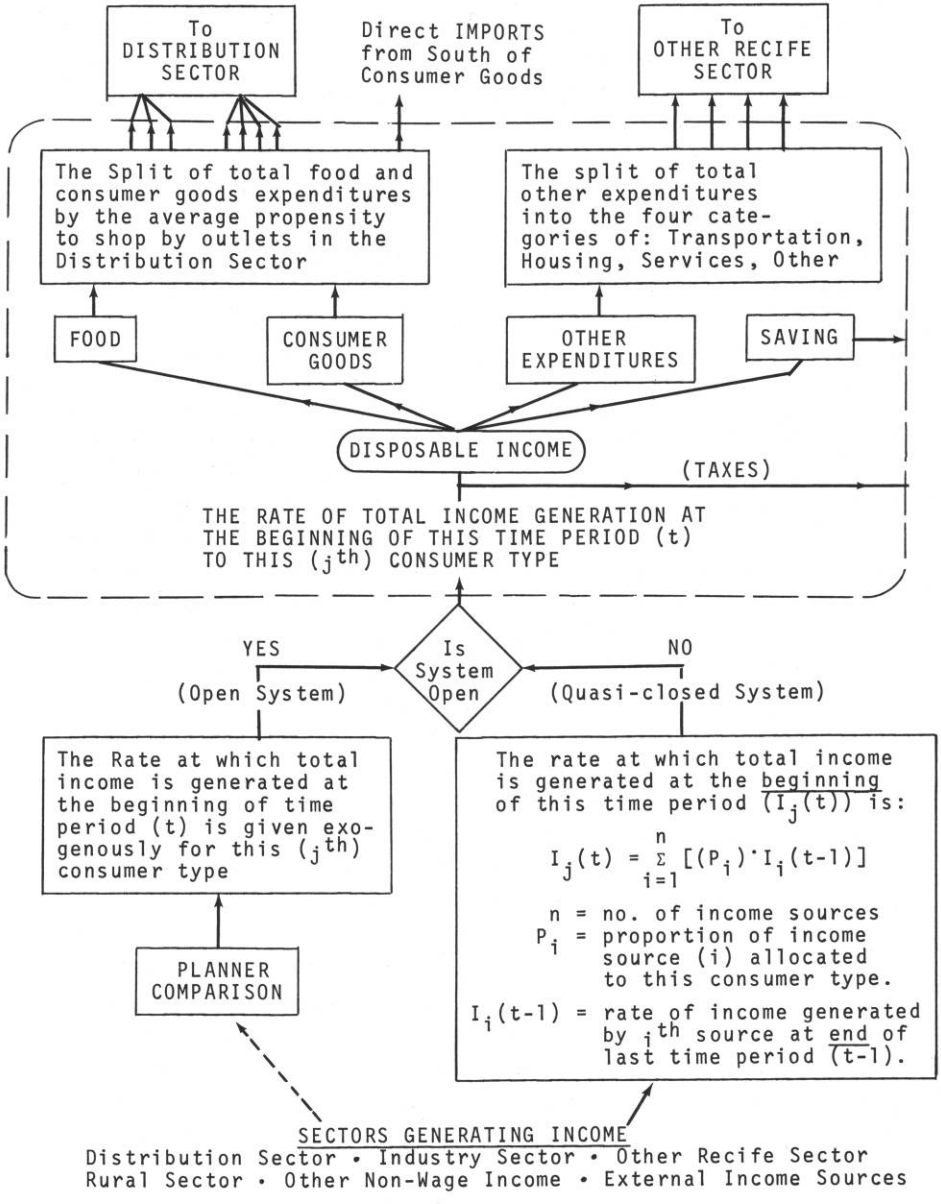
1. Food expenditures in:
   a. Modern food outlets
   b. Traditional food outlets
   c. Other food outlets
2. Consumer goods expenditures in:
   a. Modern food outlets
   b. Traditional food outlets
   c. Modern non-food outlets
   d. Traditional non-food outlets
3. Other expenditures on:
   a. Automobile-transportation
   b. Services
   c. Housing-rent
   d. Miscellaneous
4. Consumer goods purchased directly from importation and not flowing through the distribution sector
5. Taxes
6. Savings

Two definitions are needed at this point in the discussion. First, average propensity to consume is defined as the proportion of disposable income spent in a given category of consumption (1-4 above) for each class of consumers. Second, the average shopping propensity is defined as the proportion of a given category of expenditures which is spent in a given location (the letters under each numbered category above).

The level of these final expenditures by location of purchase is a function of the total income generated to an income classification, the average propensities to consume, the average shopping propensities, and the relative prices between the outlets in the distribution sector. Figure 11.2 outlines the structure of a typical consumer class.

Briefly, given total income, taxes are deleted to obtain disposable income. This disposable income is split according to the average propensities to consume food, consumer goods and other expenditures, and the average propensity to save. Intermediate expenditures are determined based on the amount of incremental real income generated from shifts in buying behavior from the last time period within each consumer type. As consumers shift to lower priced outlets, it is assumed that they will initially buy the same quantity in the new purchase outlet as in the old. Some money will be left after the same amount is bought at lower prices. The amount of "freed income" or incremental real income generated is a function of the relative prices between retail outlets and the degree to which shopping propensities shifted in favor of the lower priced outlets. The freed income can be spent according to the

Figure 11.2 Internal Component Structure of a Typical Consumer Type
The Consumption-Income Sector



current average propensities to consume (in the same manner as all the rest of the income is spent) or according to a set of marginal propensities (applicable only to additions in income).

The next step is the final determination of expenditures. The real income to the consumer is not only affected by shifting buying behavior, but also by the change in the level of prices within retail outlets usually caused by competitive reaction within the distribution sector. Thus, there is a second type of incremental real income generated to the consumers as a function of the change in relative prices from the last time period within retail outlets. This is computed using the same assumptions on freed income derived from buying the same quantity and then spending that freed income according to a predefined set of average or marginal propensities. The result is the allocation of final expenditures according to the list defined at the beginning of this section.

The Inclusion of Incremental Changes in Real Income - The major purpose for introducing real income changes into the model is to show how changing relative price structures and changing consumer behavior could induce increases in the real wealth of final consumers and changes in income distribution. Although this is an initial attempt, it has proven very useful in the analysis of reform options implemented in the distribution sector. As stated, incremental real income is derived from changing consumer buying habits and from changing prices within the distribution sector. It is important to explain the impact on the elasticity assumptions which this structure implies.

The meaning of elasticity has been broadened with the inclusion of incremental real income changes. Normally, the substitution and income effects associated with lower prices are product-oriented. Here, the meaning of elasticity is widened to include the income and substitution effects between institutions, i.e., modern and traditional retail outlets.

The consumer substitutes in favor of the lower priced outlets, which creates increases in real income and permits the consumer to attain a higher indifference curve. The break between the substitution and income effects is at the point of buying the same quantity or basket of goods, i.e., Hicks' definition of "apparent real income."[9] Thus, in the substitution effect, perfect

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[9]Milton Friedman, *Price Theory* (Chicago: Aldine, 1966), p. 51.

nelasticity is assumed. When the income effect is included, the final elasticity assumption is somewhere between perfect inelasticity and unitary elasticity (an assumption justified in most consumer research in developing countries).[10]

By careful manipulation of the average propensity to shop, it is possible to widen the range of permissible elasticity infinitely. Further, developing a planner entry routine for the average propensity to shop would allow the definition of elasticity to include such important variables as consumer attitudes, location or availability of outlets, and product mix.

The Definition of Units and Prices - The flows which have been defined in this sector are money flows of expenditures or income. Each of these flows is composed of some number of physical units flowing between two points, and a price per unit associated with that physical flow. For example,

Expenditures on Food	=	Price/Unit of Food	x	Number of Units of Food

Units and prices must be defined in order to evaluate some of the reforms and to develop the changes in real income from shifting shopping behavior and changing prices.

The basic definition of a "unit" is that package of goods which an average family purchased in the initial time period (one year).[11] This unit will be referred to as a CUG or a "common unit of goods." There are four basic CUG packages defined:

1. Food
2. Consumer non-durable goods
3. Other expenditures (rents, services, transportation)
4. Savings

The second CUG category is subdivided into consumer goods purchased in food outlets and consumer goods purchased in non-food merchandising outlets.

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[10] For example, see: Robert D. Stevens, *The Elasticity of Food Consumption Associated with Changes in Income in Developing Countries*, Foreign Agricultural Economic Report No. 23, Economics Research Service (Washington: U.S. Department of Agriculture, 1965).

[11] Griggs, *op. cit.*, pp. 127 and 129.

In order to attach numbers to the units and prices, the first step is to input to the model the number of families in Recife at the beginning of the initial time period and the expected change in that number over the time of the simulation. This will equal the number of CUGs at the initial point in time. The price per CUG is the expenditures for that category divided by the number of CUGs. The meaning of price, then, is the average cost to an average family for that category of goods. Table 11.2, taken from some preliminary simulations of the consumption sector, further explains this point.

For example, the average family pays US$740 for food in one year. The very low income family would buy less than one CUG and thus spend less per family; likewise, the high income family buys more than one CUG per family and thus pays more per family. The comparison between the price of a CUG for the high income class and the low income class is dependent on where they buy their CUGs and the relative prices in those buying locations. If the high income class purchased relatively more in the modern food outlets (which were lower in price than the traditional outlets), then the price per CUG to the high income person would be lower than the price to the low income person.

It is important to understand the impact of changing real income on both the number of CUGs consumed and the prices of the CUGs. When a consumer shifts food and/or consumer goods expenditures from one type of outlet to another, he will initially consume the same amount of goods, i.e., the same number of CUGs of food and the same number of CUGs of consumer goods. If the price level in the new outlet of purchase is lower, incremental real income is generated. When that freed income is split according to the consumer's average propensity to consume, he will be buying more of all the types of CUGs defined, although the value of expenditures on the CUGs with lower prices will be relatively lower. The price per unit in the modern and traditional outlets has not varied, but the proportion of the units which the consumer buys in each outlet has altered. Thus, the average price per unit to the consumer will have lowered (that per-unit price change will be different for each consumer type depending on the amount of expenditures shifted to the lower priced outlet).

Model Entry Points - "Entry points" are those parameter inputs most likely to be changed with the implementation of a reform option. It is generally on these entry points that planner entry

Table 11.2 The Different "Common Units of Goods" (CUGs), Price per CUG, and Relative Consumer Purchases

TYPE OF CUG	(1) Total Consumer Expenditures on CUGS (in millions of $US)	(2) Average Price per CUG[a]	(3) Consumer Expenditures (in millions of $US)		(4) Expenditures per Family (in $US)	
			High Income	Low Income	High Income[b]	Low Income[c]
Food	122	740	4.9	46	1485	590
Modern Outlets	15	91	1.2	4.6	365	59
Traditional Outlets	97	590	3.1	38.6	940	495
Other	10	59	.6	2.8	180	36
Consumer Goods	78	470	11.5	15.4	3500	198
Other Expenditures on Goods and Services	93	560	13.2	15.7	4000	202
Saving	16	97	3.3	0	1000	0
	$309	$1867	$32.9	$77.1	$9985	$990

[a]The average price per CUG is Total Expenditures divided by Total Initial Number of CUGs. The Initial Number of CUGs is defined as the total number of family units (165,000) at the beginning of the time period under study.

[b]The number of high income families in urban Recife is 3,300, developed from Table 4.2.

[c]The number of low income families in urban Recife is 78,000, developed from Table 4.2.

SOURCE: SUDENE/MSU Consumer Surveys (1967) and "Base" Simulation-Time Period 1.

routines are defined either to explain the behavioral assumptions or hypothesize the impact of a policy variable change. The following are the most pertinent user-supplied inputs:

1. Initial level of consumer income from wage and non-wage sources for each consumer type.

2. The effective rate of taxation on total income by consumer type.

3. The average propensity to consume food, consumer goods, and other (services, rents, etc.); and the average propensity to save for each consumer class.

4. The average propensity to shop for food and consumer goods by type of outlet in the distribution sector.

The Distribution Sector

The distribution sector is defined as that set of channel relationships in the urban area of Recife which satisfy final consumer demand. Thus, this sector is consumer oriented, and does not consider the distribution of capital goods, inter-industry distribution, and some of the specialized durable goods such as automobiles and trucks. Distribution for these cases is handled within the respective productive sectors or the other Recife sector. For example, the distribution structure and costs for the construction materials industry in Recife are included within the structure of that industry type.

The export of goods through the port of Recife is analyzed as part of the supply sector. For example, the export of sugar and cotton that flow through Recife from the rural sector is considered within the rural region. The handling and distribution costs in Recife are defined within the rural sector, with the wages and variable costs generated in Recife assigned to the appropriate urban sectors.

Defining Distribution Types - The distribution sector is divided into six distribution types. Each type represents a particular grouping of channel members, including wholesalers and retailers in the Recife area.

The channel/outlet types defined in the distribution sector are as follows:

1. Modern food channel/outlets. These include what has been defined as modern retailers and their major wholesale suppliers in the Recife area. The basic criteria used for inclusion of a channel member in this group was whether his operation at the retail level involved self-service selling of both food and consumer goods.

2. Traditional "type 1" food channel/outlets. These are street and public markets and other atomistic channel members, both wholesale and retail, which operate within relatively large economic groupings (called fairs) around the city. This channel is considered to have both food and non-food consumer goods flowing through it.

3. Traditional "type 2" food channel/outlets. These are the small and neighborhood retailers and wholesalers that operate on an independent basis and are generally not grouped into the type of "markets" defined in traditional "type 1." They have fixed locations for business and some kind of "structure" in which business is conducted, i.e., a "store." This channel is considered to have both food and non-food consumer goods flowing through it.

4. Other food channel/outlets. This is the grouping of all other channels by which food reaches the final consumer. The restaurant trade makes up the major portion of this type.

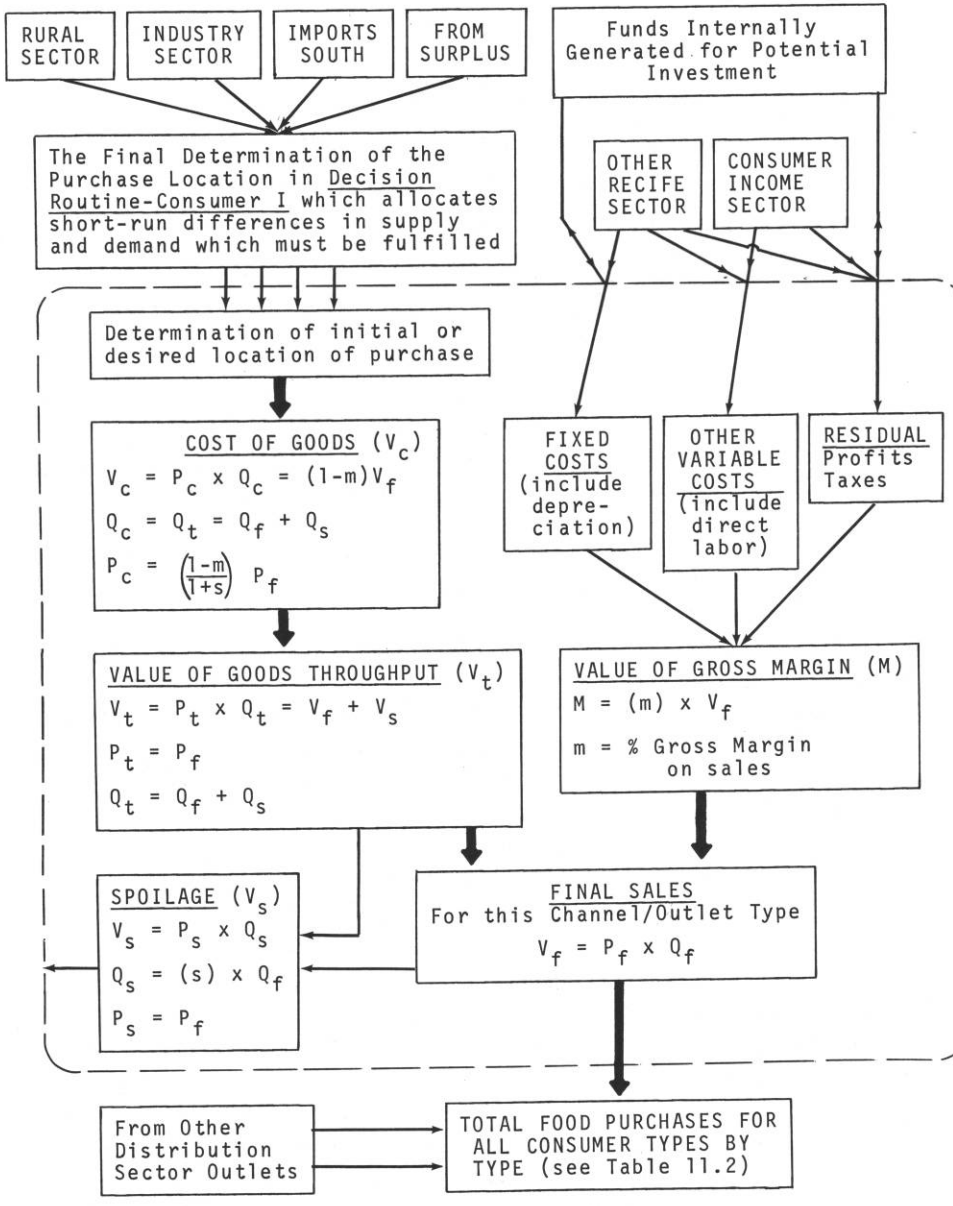
5. Modern non-food channels. This channel is composed of the large-scale merchandising methods consistent with department stores and discount houses. At the present time, only two retail outlets in Recife are classified within this group.

6. Traditional non-food channels. This channel includes all other non-food consumer goods trade carried out in Recife.

The Structural Relationships - The consumption sector determines the final demand placed on the distribution sector for food and consumer goods. Given that final demand, the input demand by the distribution sector for food and consumer goods to fulfill final consumer demand and the determination of the demand for other inputs must be calculated.

Figure 11.3 summarizes the type and sources of inputs required by the distribution sector in order to meet final demand and an outline of the computational structure. The demand for food and consumer goods by the sector is a function of the level of gross margin. Gross margin, in turn, is a function of the level of price per unit sale, spoilage, and cost per unit purchase. The result is the total volume of goods, "goods throughput," which the distribution sector must purchase. The location of the purchasing (from the local industry sector, the rural sector, or importation) is determined in the Decision Routine-Consumer I according to the level of local supply available and the "decision rules" employed in allocating any surplus or deficit that exists between local supply and demand.

Figure 11.3 Distribution Sector--Internal Component
Structure of a Typical Distribution Type



note: V = Value of a flow
Q = Volume of a flow
P = Price of a flow
(all per unit time)

The level of labor demand and other variable costs is a function of the "goods throughput" in the sector. Thus, changing spoilage without any changes in final sales will still alter the level of labor and other variable costs input. Taxes are a function of gross margin. This is assumed due to the nature of the tax structure in Brazil based on the payment of a certain percentage of a "quasi" value added at each stage in the system. Residual net profits are distributed or left undistributed. The distributed profits go to the consumption-income sector as consumer income. Undistributed profits and depreciation are combined to give the level of internal funds generated for potential investment or hoarding.

The Shopping Propensity Matrix and the Distribution Sector - In the consumption sector, one of the major parameter inputs is the shopping propensity matrix. This matrix determines the location of purchase for all the consumer types. It is important to understand its implications on the operation of the distribution sector because the actions of participants in the distribution sector will, to a large extent, determine the degree to which consumers will shift from one type of outlet to another. In the consumer surveys conducted in Recife, the consumers put high priority on price and location in the choice of place of purchase. Also important is the mix of products offered by the distribution outlets. For example, until very recently, none of the self-service operators offered any fresh fruits or vegetables, and all such purchases had to be made in the street and public markets. With the inclusion of a more complete product mix, the shift of buying habits may be altered further. Thus, the characteristics of the modern and traditional outlets must be explicitly defined for each simulation run in order to ensure that the correct shopping propensity matrix is used.

The Significance of Modern and Traditional Types - Specific modern channel arrangements are defined in the distribution sector to permit the analysis of demand and supply relationships under various assumed structural arrangements. The modern food channel includes large-scale retailers and wholesalers which have a general philosophy of "low margin and high turnover," and a modern non-food channel consisting of large-scale merchandising stores for more durable consumer goods. These modern types are included in the model to permit the analysis of the effect of modernized institutions on (1) the horizontal competitive structure within the

distribution sector, (2) the consumer buying habits and resultant effects on income spent on food vs non-food consumption, and (3) the vertical buying patterns and coordinating efforts of the distribution sector itself.

The characteristics of the modern types can vary between simulation runs. For example, in one initial run, all self-service outlets are included in the modern food channel/outlet type. In other runs, only the large volume, low margin units are included. The results show significant differences in both buying and selling. Further, it is hoped that the effects on the traditional operators of competitive pressure from the modern operators can be shown. For example, traditional operators can react to changes in the distribution sector by increasing efficiency through coordinated action or by dropping out of the system.

Margin, Spoilage, and Input Demand - The determination of gross margin and spoilage are outside the internal structure of the distribution sector. They are entered exogenously or through planner entry routines.

It is important to understand the implications of changing either the gross margin or the rate of spoilage. Without proper adjustments in these highly related variables, results could be very misleading. For example, the effect of lowering a food margin while holding sales and price constant would be to increase the demand for food by the distribution sector (or to increase the cost per unit of input, causing the value, but not the quantity, of input to change). Thus, careful analysis of the effects of changing a margin must be made before any alteration is attempted.

In the case of spoilage rate, the interdependence with other factors is even more important. For example, when we reduce spoilage significantly, how will the retailer react? Will he keep his present actual margin and cut price significantly, or will he try to achieve his current mark-up per unit, thus increasing profits but not lowering the price? Further, how will the poorer consumer react when less of the "spoiled but salable" goods are available to those who traditionally buy them? (Lowering spoilage could hurt the poorer consumer.)

The high interdependence of price, cost, margin, and spoilage rates demonstrates further the potential usefulness of PERs. There are a number of assumed relationships which could be applied under various hypothesized external, competitive, and reform situations. By not limiting the operation of the model to one set of

relationships, the ability of the model to deal with broader problem analyses is enhanced.

Model Entry Points - The user of the model can alter the magnitude and relationships associated with the following important parameter input variables in the distribution sector for each of the channel/outlet types defined. Within the modern and traditional food outlets, a further breakdown between food and consumer goods is permitted.

1. The relative price index (which relates the average final selling price in modern outlets to the price in the traditional outlets).

2. The gross margin (which is defined as the difference between cost of goods and sales as a proportion of sales).

3. The rate of spoilage as a proportion of sales.

4. The technical coefficients for labor, other variable costs, and taxes.

5. The breakdown of the source of purchase of the raw material inputs, food, and consumer goods between local industry, the rural sector and importation. (At this point, food may be further broken down into processed and non-processed food categories.)

The Recife Industry Sector

This sector constitutes the industrial productive enterprises in and around Recife. The criteria for inclusion of a firm in the urban industry sector was whether its contribution of wages was primarily to the urban Recife consumer. The model of local Recife industry consists of manufacturing, assembling, and processing firms categorized into seven industry groups or types as follows:

1. Agricultural inputs production

2. Processed food production

3. Consumer goods production

4. Construction materials production

5. Capital equipment and other equipment, assembly, and manufacturing

6. Industry supplier products manufacturing

7. All manufacturing and processing not explicitly included in the above categories

Within each of the seven defined industry types are the sub-industry divisions which make up the total industry type. Agricul-

tural inputs are composed of fertilizer and insecticide producers. Processed food production comes from a variety of sources--beverages, vegetable oils, fruit and vegetable processors, milk processors, flour mills (wheat and manioc), candy and baby food producers, and meat and poultry processing. Consumer goods are composed of a diverse mix of operations, such as soap production, pots and pans, matches, plastics, furniture, textiles, cigarettes, and electrical appliances. The supplier products type is generally made up of packaging manufacturers and other such suppliers of goods for use in industry. In the Recife area most construction materials production is in the form of bricks, cement, roofing, and wall tiles. Equipment manufacturing is composed of farm implements, irrigation tubes, and final assembly of some processing machinery. The last industry type--the "other" category--contains very little at the present time, with its main firm being a small-scale operation for the final assembly of jeeps and small trucks.

The Structure of Industry Types - The internal structure of each of the seven industry types differs only in the method of determining final outputs and the means by which these outputs are distributed. Three groupings of the industry types have different means of output determination and distribution: (1) processed foods and consumer goods production, (2) the supplier industry type, and (3) the other four industry types.

Output Determination and Distribution -

Consumer Goods and Processed Food - The outputs of these two types are given by a simple dynamic growth function, which states that output next time period is (1 + expected growth rate) on the output of the type last time period. Thus, the output of the type is "determined" within the industry sector and is not directly a function of the final demand placed on the industry type. This does not mean, however, that the output is not conditioned by the expectations of demand by the firms in the industry type.

The distribution of the output of these two types can go to Recife, to the rural sector for final rural consumption, or into the South-export sector. Output and its distribution are finalized in the Decision Routine-Consumer I as a function of local demand and the economic flexibility of the industry type, given by the type and level of decision rules used in the routine.

The use of the Decision Routine-Consumer I can alter the previously determined output. For example, one of the decision rules permits a time-variant increase in output if a deficit exists or a

decrease if a surplus exists. Also, the final allocation of a total output may be changed within the routine depending on the decision rules employed.

The potential effects of this decision routine on processed foods and consumer goods industry types can be great. At one extreme there can be total rigidity, i.e., not allowing the industry type to react to potential surpluses or deficits. Or, at the other extreme, by negating any of the above output determination, the industry type can be permitted to passively accept whatever the distribution sector demands, i.e., complete demand reaction or supply flexibility.

Other, Construction Material, Capital Equipment, and Agricultural Input Industry Types - The output for each of the four types included in this section is determined exactly as for the other types already described--by calculating a simple dynamic growth rate based on the output of the type for the last time period.

The major difference between the processed food and consumer goods type and those included here is in the allocation of the output once it is determined. In the first case, the outputs are first split, and then go to the Decision Routine-Consumer I for final solution according to the prescribed set of decision rules. In this case, the output determined by the growth function will be the actual output of the industry type. It will not be changed by any future action within the model within a given time period.

For these four industry types, a separate routine very similar to the Consumer I is developed, called the Decision Routine-Capital II. The major difference between the two routines is that Capital II defines the exact allocation process. Briefly, Capital II determines the distribution of the given output of each of the four industry types. A priority on demand is given to local Recife demand. If output remains, the rural sector demand is considered next, followed by exportation or inventory accumulation.

The Structure of the Supplier Industry Type - In this industry type, output is a function of the demand placed on it from the rural sector and the inter-industry demand from all of the other industry types. The supplier type produces certain types of facilitory inputs such as packaging materials which are locally consumed by industry. It was found in the industry studies done in Recife that the firms in this type were often closely tied (frequently by ownership) to the final goods producing firms. There, output closely correlates the total final demand on the other industry types.

Input Determination and Sources of Purchase - Once the output of each of the seven industry types is computed, the inputs required to produce that output are determined. Figure 11.4 is an example of one industry type within the sector. Raw material demand is composed of agricultural and non-agricultural inputs. Facilitory inputs are composed of such costs as packaging, transportation, and other supplies; while other variable costs include such things as electricity, power, and advertising. Direct labor expenses are split between those necessary in manufacturing and distribution. All of these variable expenses are assumed to be a function of a technical coefficient (relating the value of input per unit value of output) and the level of output. Fixed charges and depreciation are based on current asset value and capacity. Profits are determined as a residual and are either allocated as distributed or undistributed. Undistributed profits and depreciation are combined to determine the level of internal funds generated for potential investment.

Once the level of inputs is set, the sources of purchase are determined. As indicated in Figure 11.4, most of the inputs can come from more than one sector in the model.

Entry Points - The growth rates, technical coefficients, and location of purchase parameters are all potential points of planner entry. They form the basic parameter inputs into the industry sector and are readily open for variation from one time period to the next. Also, they may be functions of capacity or other variables exogenously given to the system.

The Rural Sector

The Structure of the Rural Sector - The structure of the rural sector can be divided into four parts:

1. Rural farm and town consumption
2. Production determination and evaluation of factor inputs
3. Rural output markets
4. Rural input markets

Figure 11.5 outlines the major components in the rural sector and the relevant basic flows.

The final consumption component in the rural sector is composed of both farm and non-farm consumers living in the small towns and cities scattered throughout the four-state area.

Figure 11.4 The Recife Industry Sector--Internal Component Structure of a Typical Industry Type: The Processed Food Industry

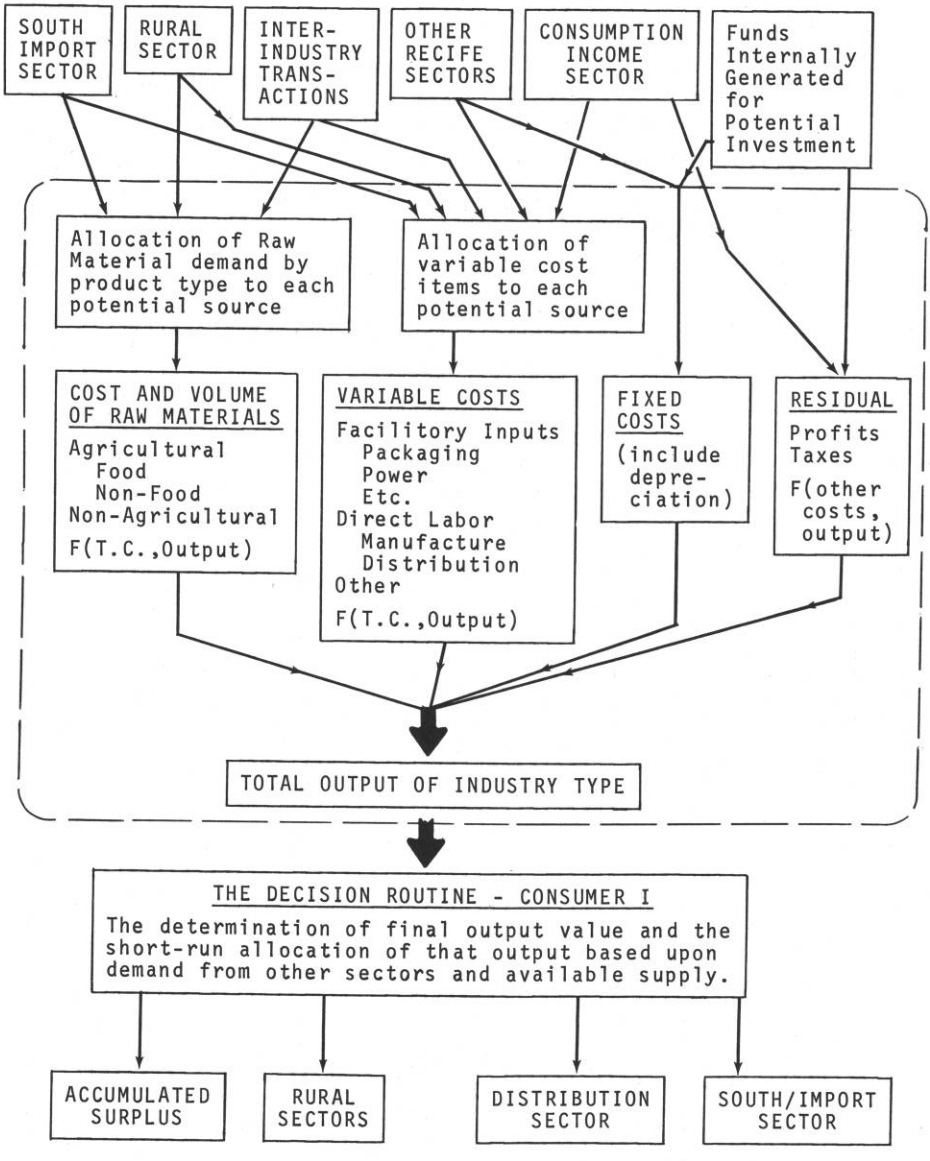
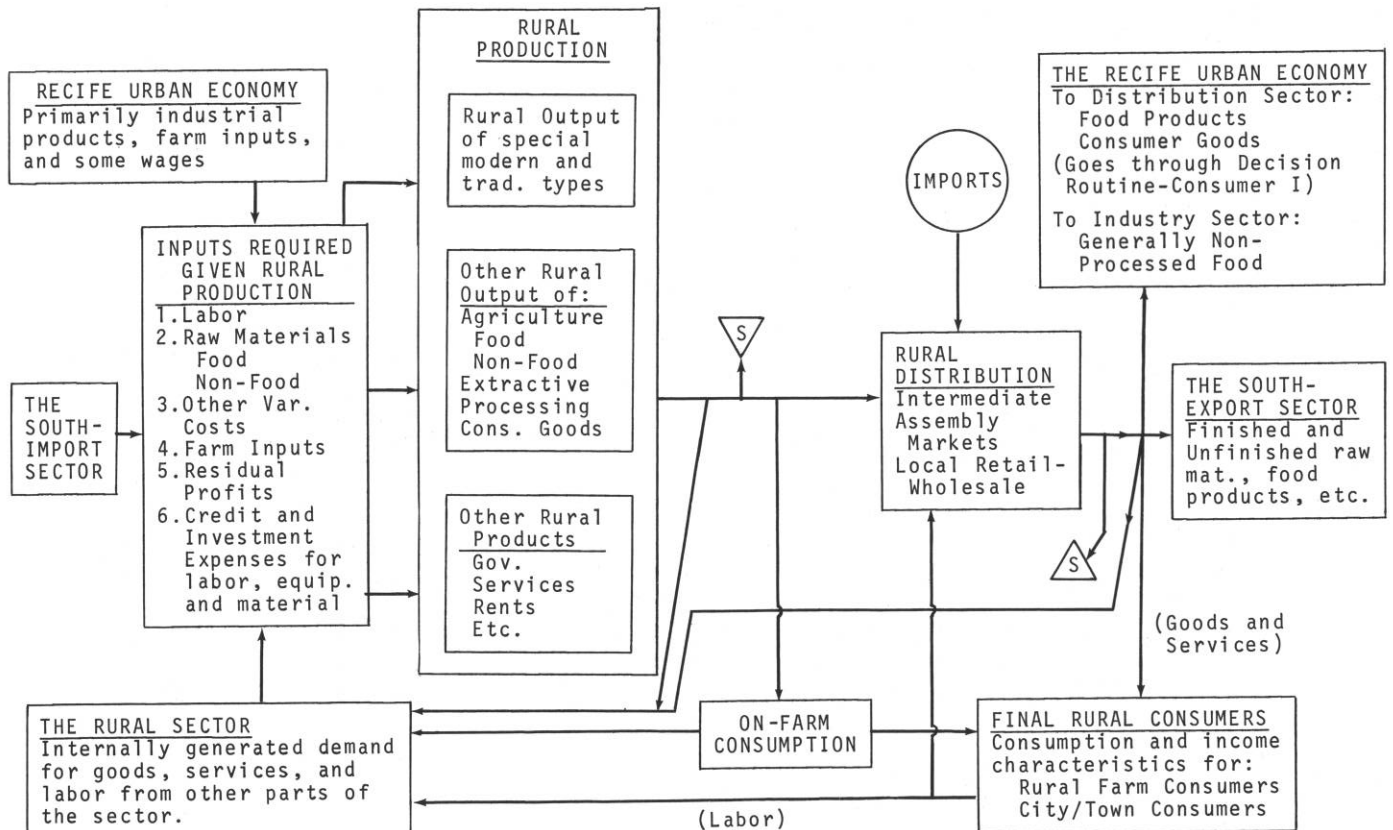


Figure 11.5 The Rural Sector



The productive component in the rural sector incorporates all types of rural output. Concentration is on the production of food and food-related products and the option is open to explicitly delineate specific products or product types within the productive component between modern and traditional production methods.

Included in the distribution component are all activities associated with the distribution of all types of rural output within the rural area. Again, the emphasis is on the distribution of food products. Rural assemblers, truckers, and brokers are an integral part of this component. For final consumer demand within the rural sector, the wholesale and the retail functions are added.

The determination of rural inputs is a function of the level of total rural output and the technical coefficients relating inputs to outputs. Several different types of inputs are included, along with the sources of purchase for those inputs from within the rural sector, from Recife, or from importation.

Rural Final Consumption Determination - The determination of final consumption expenditures for the rural sector is divided into farm and non-farm consumers. As in the consumption sector, the option is present for either an "open" or a "quasi-closed" system for rural income generation.

Once this income is defined, it is split according to average propensity to consume the following:

1. Food
2. Consumer goods
3. Miscellaneous (services, rents, taxes, etc.)
4. Saving

The procedure is performed separately for the farm and non-farm consumer; it is thus necessary to define average propensities for both consumer types.

Rural Sector Output Determination - The determination of outputs of the rural sector is divided into two categories: modern-traditional special types and other rural output. This is done to permit a partial breakdown in products which are the most important or on which specific study is desired.

Modern-Traditional Special Types - The first category into which rural outputs are grouped is designed to permit specific analysis of products or product groups. From one to five types may be analyzed. For each of the products chosen, the total output is divided between modern and traditional operators, with the

output of each being the multiple of yield (productivity) and land in use. Thus,

$$\text{Output}_{mod} = \text{Yield}_{mod} \times \text{Area}_{mod}$$

$$\text{Output}_{trad} = \text{Yield}_{trad} \times \text{Area}_{trad}$$

$$\text{Total Output} = \text{Output}_{mod} + \text{Output}_{trad}$$

This type of structure permits the switching of land from traditional to modern operations. It also permits the model user to make yield or land use dependent on other variables such as expected product prices, input prices, labor availability, equipment availability, credit and weather conditions.

For the determination of the output of the special modern and traditional types, the average yield per hectare and the number of hectares under cultivation are parameter inputs. These inputs are necessary for both the traditional and modern operator in any set of special products or product groups defined.

The potential make-up of these five types can come from food production, non-food agricultural production, or commodities which have both food and non-food products, such as cotton.

Other Rural Output - The second category for rural output determination includes all rural production not explicitly considered in the first special categories. This output is divided into four classes:

1. Agricultural food production
2. Agricultural non-food production
3. Extractive industries
4. All other (such as manufacturing, processing, etc.)

For the determination of output in each of the four classes, a simple growth function is assumed on the output of each class.

$$\text{Output (this time period)} = (1 + \text{growth rate}) \times \text{Output (last time period)}$$

Two special product classes are computed within rural output determination--consumer goods production and processed food production, which are needed explicitly for the Decision Routine-Consumer I. This output is considered to be within the fourth class of general outputs listed above, and is included in that output figure.

Distribution of Rural Output - After total output is determined, the distribution of that output is computed. Agricultural

food distribution in the rural area is handled separately from the other types of output. Food, input use (such as seed), and on-farm consumption are deleted, along with any spoilage taking place before the first sale. The remaining quantity of food then enters the distribution channel and is split between the three potential areas of sale: to local rural consumption, to Recife through the urban distribution sector, and to exportation. On each of these flows, different rates of spoilage and margins are determined in order to obtain the net quantity and value of goods available for sale at each source of purchase.

For all non-food rural production, any loss in distribution is determined and appropriate margins added to output value to obtain the total potential value of sales. This output value is split between the demand placed on that output by the Recife distribution and industry sectors, exportation, and local consumption by final consumers and other industry in the rural sector.

The exact flows are not finalized until the Decision Routines Consumer I and Capital II have allocated any difference in the local supply and demand situation.

Rural Sector Input Determination - Inputs must be defined for each of the four types of rural products and independently for the special modern and traditional product types. The inputs are divided into seven categories which, when summed, are equal to the value of total output. They are as follows:

1. Direct labor input
2. Farm inputs such as fertilizer and insecticides
3. Raw materials input of food products
4. Raw materials input of other products
5. Other variable costs (including taxes)
6. Investment expenses (including the purchase of construction materials, labor, capital and other equipment and capital costs)
7. Net profit

The last two are considered residual allocations and depend on the amount available after other expenses. In the determination of these inputs, different technical coefficients are used for the modern and traditional operators defined and a third set of coefficients is used for the four basic classes of other rural output.

After determining the magnitude of input demand, potential sources of purchase are calculated. For example, all labor will

come from the rural sector itself and thus generate income to the final rural consumers. Farm inputs may come from Recife industry, local rural industry, or from importation. The location of purchase is not finalized at this point, however. Those inputs which are demanded from Recife industry go to the Capital II routine in order to determine if the Recife industry has sufficient available supply to meet the rural demand.

Summary Calculations and Final Supply-Demand Allocations - The final determination of the sources of purchase for inputs demanded by the rural sector and the allocation of rural output to other parts of the economy can only be finalized after the decision routines are completed.

The Decision Routine-Consumer I determines the distribution of rurally produced processed food and consumer goods, and the amount of non-processed food which Recife demands from the rural area. Further, this routine allocates the quantity of processed food and consumer goods produced in the Recife industry sector to be made available to the rural sector.

The Capital II routine determines if the demand for certain of the inputs required by the rural sector can be fulfilled by the Recife industry sector. In cases where the supply is insufficient, the demand is transferred to importation.

The demands resolved in the decision routines are combined with the demands by final rural consumers and input demands for the rural production. The total demand for goods by the rural sector and the total supplies which the sector can make available to meet those internal demands are compared. Any excess of supply in the four categories is either allocated to surplus or to exportation. Any excess in demand is automatically transferred to an increase in importation.

Finally, the proportion of total exports which flow through the port of Recife are determined and the wages generated to the consumption-income sector in Recife are calculated. These wages include such items as storage and handling costs. To determine the total consumer income generated to Recife from the rural sector, this income is added to the distributed profits which are "spent" in Recife (primarily by higher income consumers) for consumer-oriented goods.

Model Entry Points - In the determination of gross rural output and its distribution, the following parameters are of the most importance:

1. The yield and area for the five or less products defined in the modern-traditional special categories.

2. The growth rate on other types of rural output.

3. The rate of spoilage, on-farm consumption and margins within rural production and distribution.

For rural consumption determination, gross consumer income for rural and town and average propensities to consume are the most important.

The most crucial inputs in the calculation of inputs for consumption and production in the rural sector are the location of purchase parameters on the total demand for inputs and the technical coefficients on the seven types of inputs for modern, traditional, and other rural output.

The Other Recife Sector

Purpose and Orientation - The other Recife sector is composed of a large conglomeration of economic activities. They are the activities about which the most limited information is available and are less important than the others for the analysis of the market-oriented reforms to be presented. For the purposes of this model, this sector's contribution to the total framework lies in two major areas:

1. As a generator of income for the consumption sector from other urban economic activity, government and public transfer payments.

2. As an investment demand transfer mechanism, investment expenditures are translated into demands for labor, construction materials, and equipment.

The other Recife sector is built into the model to "round out" the economic structure of urban Recife by including the other primary economic activities of the city. The structure is oriented to facilitate more detailed analyses in the other principal sectors of the model.

The economic activity present in this sector is divided between nine components:

1. Automobile and transportation
2. Service industry
3. Housing and rents
4. Construction demand
5. Capital equipment demand
6. Minimal subsistence unit (unaccounted for wages and "in kind" transfers)

7. Government revenues, expenditures, and public transfer payments
8. Other miscellaneous

The first component, automobile and transportation, emphasizes the sales and services associated with the demand for vehicles in the urban area. This demand originates from all three of the other urban sectors (consumption-income, industry, and distribution). The service industry is primarily oriented to final consumers in Recife.

The flow of all housing expenses and rent payments enters the other Recife sector. This component acts as a transfer agent for these payments. The appropriate expenses associated with maintenance, labor, materials, and taxes are deleted from total payments and the remaining net value of payments are considered available profits to be distributed or undistributed.

The construction and capital equipment components are investment transfer agents for all the urban sectors in the model. Investment expenditures arise primarily from the other sectors in the system, but there are additions to that demand from components within the other Recife sector (such as housing, government, and transportation). The components allocate the total level of investment expenditures between labor, construction materials, and equipment demands. Then the material and equipment demands are split between local and importation, depending on the availability of local supply (see Decision Routine-Capital II).

The terminal demand from investment funds is split into two kinds of construction demand and capital equipment demand. The first kind of construction demand is non-industrial construction. This includes investment in the construction of housing, apartments, schools and hospitals. Such demand is included only to show the "construction effect" which these funds generate in the form of economic flows within the economy. The second type of construction demand is investment creating industrial or distributive capacity. The differentiation between the two is further outlined in the analysis of the investment sector, but their sole purpose in this sector is to complete the flow of labor and material demand generated in the system.

A minimal subsistence unit is included to enable the balancing of low and very low income people in the consumption-income sector. It includes wages not accounted for in other sectors, public transfer payments, income paid "in kind," and any statistical discrepancy.

The "miscellaneous other component" is included to permit further expansion or disaggregation in future simulations. Currently, there is no economic activity assumed to be moving through this unit.

The last component in this sector is government. Government is an exceedingly important part of the urban Recife economy, but little information was developed in this research study. It was impossible to include all of the detailed activities taking place within the government sector which affect the flows of revenues and expenditures in the region. It is important to understand that government has been incorporated only to facilitate the analysis of the other sectors and the reform options oriented to other parts of the system. In this regard, the major impact of the government sector in economic flows is in the consumer income generated, transfers, and tax revenues received. In the Recife Consumer Study, almost one-third of all respondents indicated that a major portion of their income was derived from some government-associated unit.[12]

Thus, within the other Recife sector the emphasis on government is in the explicit economic flows it stimulates. Of course, other important governmental activities must be considered in the total picture of the system. Two particular areas of regulation--investment expenditures and investment incentives--are analyzed within the framework of the investment sector.

The Structural Relationships - Since the other Recife sector is oriented to facilitate the analysis of the other parts of the Recife Systems Model, its structure passively receives the demands placed on it from the other sectors. Other expenditures from the consumption-income sector, the variable and fixed charges in distribution and industry, the inflow of investment both internal and external to the system, and all taxes are the "demands" placed on this sector. Other exogenous inputs, such as minimal subsistence and the net flow of tax revenues from outside the system are also included. This forms the "terminal demand" which the other sectors in the model place on the other Recife sector. Added to this "terminal demand" is the "intermediate" demand which arises from transactions within the sector between the nine economic units. The result is the total demand and, thus, the total output of the sector. For example, the total "output" of the services component

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[12] Nason, *op. cit.*, p. 68 (Sources of Income to Consumers).

consists of the terminal demand placed on it by the consumption, distribution, and industry sectors and the "intermediate" demand generated from other components within the sector such as automobile-transportation, housing-rents, and government.

Given total output, the demand for inputs is also split between internally generated supply and the demand placed on other sectors in the model. Thus, by definition, the "intermediate" supply (that part supplied internally by other units in the sector) is identical to "intermediate demand." The rest of the value of output is composed of the demand transfer for equipment and materials, and value added (net of taxes) generated by the nine components. Value added is split between wages and distributed profits going to the consumption-income sector and undistributed profits available for future investment. The transfer demand for construction materials and equipment enters the Decision Routine-Capital II and is compared to local supply of those products, with any deficit assumed to be imported.

Model Entry Points - If the user of the model chooses, there are three areas where PERs or changes in input parameters can be made. First, the split of terminal demands between the various components in the sector can be changed each time period for each type of terminal demand.

Second, the allocation of transfer demand and value added can also change over time. Any change in these inputs which alters the location of purchase should be done in connection with the Capital II routine, which handles the allocation of local output of investment-oriented goods.

Last and most important is the input/output matrix identifying the intra-sectoral transactions taking place and determining intermediate demand.

The South-Import and South-Export Sectors

The regional economy of Recife and its foodshed is not self-sufficient. This area of Brazil is a net importer of large quantities of food products, consumer goods, and capital equipment. These items are imported primarily from the Center-South of Brazil; some are generated in the other areas of the Northeast. Those imported from the international market frequently enter the region via the South. Exportation is limited to a few major commodities such as sugar and cotton and a few other food products and manufactured goods on a small scale.

The region is heavily dependent on other parts of Brazil for other final consumer goods. The importance of including this sector, then, becomes self-evident. Essentially, this sector in the model is defined as the "rest of the world" sector. Any transactions between participants in the defined economic system and other parts of Brazil or in other parts of the world flow through this sector. Three types of "terminals" or "interfaces" between the economic system of Recife and its four-state foodshed and the "rest of the world" are defined: other Northeast, Center-South of Brazil, and international markets.

The South-import and South-export sectors play a vital role in the structure of this model. Combined with accumulated inventories, they are the "supplier and demander of last resort." In most of the sectors, specific demands for imports and supplies of outputs for export are determined. These arise largely out of the nature of the goods involved. For example, cotton is an export crop, but most capital equipment must be imported. Further, since no simultaneous solution within the short run is attempted (or desired), differences between local supply and demand can develop. If a deficit in local supply exists after all attempts to offset it have failed, it is automatically assumed to be allocated to increases in importation. If a current surplus exists, it is assumed to be allocated to an accumulated surplus account or exported. The nature of the model forces this sector to act as a passive giver of goods to the system and, in part, as a passive receiver.

The Planner-Oriented Characteristics of the Model: PERs

The economic sectors which comprise the internal structure of the model have been discussed in detail. Their orientation focuses on final urban consumption and on the interaction between the rural and urban economies through the exchange process. The sectors are structured so as to permit the analysis of changes in the process of distribution and their impact on industrial and rural production and final consumption. This section outlines the meaning and use of "planner entry routines" (PERs), the Decision Routines Consumer I and Capital II, and the investment sector.

In segmenting these planner-oriented characteristics from the internal economic structure, the Recife Systems Model makes a major departure from other systems models and other general economic models. Ordinarily, the functional relationships are assumed in the structure of the model and their accuracy determines the

actual representativeness of the model in relation to the system under analysis. In the Recife Systems Model, an effort is made to include in the internal structure as few of these functional relationships as possible. Determination of the behavioral and structural relationships is not avoided--they are located where the user of the model can closely inspect their characteristics and easily make changes depending on the scope of analysis undertaken and the nature of programs implemented. As stated in the introduction to this chapter, these computerized routines have two distinct purposes.

First, the accounting identities and behavioral relationships defined in the internal structure are developed to permit flexibility in refining, adding to, or constructing new economic behavioral and structural relationships. Essentially, the PERs provide an extremely flexible interface between the user of the model and the model's structure. At one extreme, the user defines no PERs and just inputs the necessary parameter values required by the internal structure. Any computational relationships are done outside the model. At the other extreme, detailed computerized routines which determine the values of basic parameter inputs are constructed and linked to the internal structure through a computerized input routine.

The second purpose of the PERs is to provide the user with a means to relate policy variables which are at his disposal to guide and influence the economic system to their impact on the behavior and structure of that system. When implementing reform programs into the system, assumptions are made on the influence of various policy variables such as minimum price programs, credit, and investment incentives on key economic relationships in the system. No one combination of policy variables should be defined in the model, as the use of policy tools will vary in content and degree with different reform programs. Thus, it is the second purpose of the PERs to focus the attention of the user on this crucial set of relationships while still allowing him (in fact, almost forcing him) to evaluate his estimates of the impact of those tools on the economy's behavioral and structural relationships.

Planner Entry Routines

The term "planner entry routine" denotes any relationships explicitly defined outside the internal structure of the model whose purpose is to refine currently assumed behavioral relationships or to develop new relationships between policy variables

and that internal economic structure. Most parameter inputs required by the internal model could be used as a basis for a PER. During any one simulation, only a few should be defined relative to the evaluation of program reforms being tested. They focus the planner's attention on the structure of the system, the information required to analyze and understand the system, and the relationship between reform programs, the tools available to implement the programs, and the impact of a change on the system.

The nature of the PERs permits the planner or researcher to insert, at his discretion, the values of a significant number of the determining relationships in the system. They can be developed from experience, "best estimate," or research; there are few limitations on the types of relationships which can be used. For example, in the consumption sector, consumption expenditures to the distribution sector are expressed as a function of shopping propensities, average propensities to consume food and non-food, and income. Through the use of sub-routines incorporated into the model, the PER can assume a wide range of functional relationships in determining shopping propensities. The shopping propensities can be a function of economic variables such as price, quality and location and/or of behavioral variables such as innovativeness and modernity.

The programming of this model for the CDC 3600 computer allows any one or all of these PERs to be incorporated in the "running model" as sub-routines determining various input information for the central core model. Input values can be derived by the following means:

1. They may be exogenously given each time period based on research data, experience, or some hypothesized situation. In this case, the "paperwork" is done outside the model.

2. Functional relationships may be incorporated within model sub-routines and used in deriving the parameter values. These relationships have the following characteristics and limitations:

   a. They may be time variant or non-time variant.

   b. They may relate prices and flows.

   c. All variables must be quantified.

   d. Variables explicitly used in the model may be used in the routines as long as their value is known at the point in calculations where the PER needs them.

   e. Any variable not explicitly included in the model can be used. Examples are attitude and

communication variables and other economic variables if they can be explicitly related to the input parameters demanded by the model from the PERs.

Three basic types of PERs appear frequently in the model: technical coefficients which relate the amount and value of an input flow to the amount and value of an output flow, source split coefficients that determine the location of purchase of an input from the other sectors in the model, and receiver split coefficients that determine the distribution of output among the sectors in the model. Some other important entry points are relative price indices, margin valuation, and capacity determination.

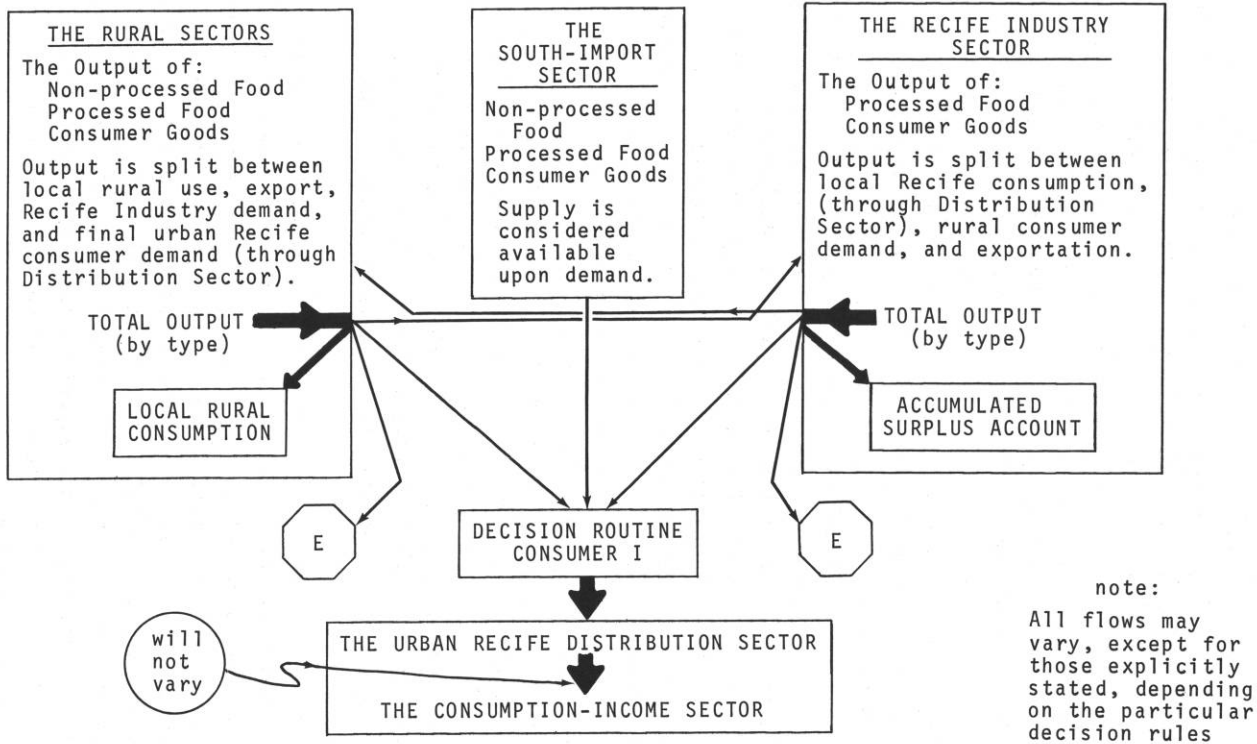
The Decision Routine-Consumer I

The Decision Routine-Consumer I is a PER included to focus the planner's attention on the problems which arise in equating local supply and demand for final consumer-oriented goods and the allocation process which must take place in meeting demand from local, rural, and import supply sectors. Besides reconciling the supply-demand differences, it permits a variety of assumptions to be made about the economic structure of the industrial and distributive sectors in the model.

The Decision Routine-Consumer I brings together the Recife distribution sector, industry sector, rural sector, and the import sector. The routine's explicit purpose is to allocate any short-run surplus or deficit which arises between local supply and demand for processed food, non-processed food and consumer goods. Figure 11.6 illustrates the interdependence of the supply and demand sectors brought together in Consumer I. The demand for these three product categories is determined from the level of consumer demand placed on the distribution sector by the consumption-income sector. Given the characteristics of the distribution sector in levels of spoilage and margin, that sector demands a given level of product from the productive sectors of the system and from importation.

On the production side, the local Recife industry and the rural sector have certain productive, technical, and managerial characteristics which, combined with their level of market knowledge, determine their output and its initial distribution. Consumer I enters the model because the flow of goods through the system is "determined" at both ends, but must be equal when they "meet." Because they are independently derived in a mathematical sense, there is no reason to believe that they would be equal

Figure 11.6 Decision Routine-Consumer I--The Interaction with the Other Economic Sectors in the Model



unless some type of allocation routine were included to ameliorate any differences which might develop between these flows.

Thus, for example, if quantity "A" is demanded of an industry type and quantity "B" is the industry supply, they may not be exactly alike at a given point in time. This problem would not arise if the flow were determined at only one end or terminal and the other passively accepted the given demand or supply. Therefore, if the industry produced only what was demanded, unit for unit, "A" would equal "B" and no difference would exist. Likewise, no difference would exist if consumers accepted whatever was supplied. The coordination between buyers and sellers is, however, seldom good enough to avoid at least short-run production deficits or surpluses.

The Decision Routine-Consumer I is structured to permit a number of alternative ways in which such differences could be allocated. These alternatives, called "decision rules" can be used in various combinations and can vary in magnitude of effect in the allocation process. For example, in the event that the production of processed food in Recife industry could not fill the demand placed on it by the distribution sector, the model user, based on research or his own judgment, could designate any combination in order or relative magnitude of the following ways of equalizing the deficit supply: use accumulated surpluses (if existant), shift part of the demand to non-processed food, increase industrial output this time or in following time periods, shift some of the output presently sold to other areas (rural or exportation) back to Recife to fulfill local demand, or shift the demand for processed food to other supply sources such as importation.

The two central criteria in the allocation process are that the demand placed by the distribution sector must be fulfilled from some source of supply (local industry, rural production, or importation), and total adjusted output of local industry must be allocated (to local consumption, rural consumption, export, or accumulated surpluses). In deficit conditions, the import sector acts as the final source of product if no other is available; in surplus conditions, the export sector and an accumulated surplus account act as final receivers of output not demanded by Recife or the rural sector.

The assumption that "demand must be fulfilled" becomes more evident when the nature of expenditures in the consumption-income sector is remembered. Given some level of income, a defined and

actual demand occurs. It is important to note that this is not necessarily the amount of goods "needed" or "wanted;" it is what the consumer does, in fact, buy. The orientation of the consumption sector (and thus Consumer I) is on determining the supply of goods required to uphold a given level of demand. If the local areas cannot supply that demand, then goods are imported.

Exogenous Inputs to Consumer I - The inputs necessary to operate Consumer I are composed of estimates of the maximum responses each decision rule could contribute to the amelioration of supply and demand differences. Some are in the form of percentages (such as maximum percentage by which output could be increased this time period) and others are in the form of actual quantity limits (such as the maximum amount of available storage facilities). Thus, if a zero is input into any decision rule, it is not used in the allocation process. Five estimates are necessary for each input parameter--one for each of the five supply-demand comparisons:

1. Recife industry--processed food
2. Recife industry--consumer goods
3. Rural sector production of processed food
4. Rural sector production of consumer goods
5. Rural sector production of non-processed foods

In making the estimates, various sequences can be assumed. Generally, however, local industry is given first priority to react to any surpluses or deficits which exist (for number five above, the rural sector is given first priority); then the rural sector; and, if all local sources are unable to equalize supply and demand, the import-export sectors and accumulated surplus are used. Appendix B contains an explicit statement of each decision rule and the potential solution sequences that are permitted.

The Focus of Consumer I - Consumer I focuses on the allocation process of consumer-oriented goods at the point in the economic system where the goods enter the distribution system, not at final consumption. In the process of allocating the supply and demand differences at this level, it presents a clear picture of purchase decisions by the urban distribution sectors and output decisions of consumer goods production, processed food production, and agricultural non-processed food output. Further, the routine brings into sharp focus the role of the decision-maker within the economic system. In determining the values of input

parameters for Consumer I, the user of the model is forced to analyze the problems of effective communication between the demanders and suppliers in the system and to make assumptions as to how participants will react to various supply and demand situations.

Consumer I permits flexibility in assumptions regarding general economic structure along a range from perfect supply inelasticity to perfect supply elasticity. The supply sectors can be allowed to react completely to any demand placed on them or they can be prevented from altering the initially determined level of output. Further, the routine can analyze the differences between "effective" and "potential" demand conditions. Consumer I can be used to evaluate the impact of the import dependency of the region and of the major changes in industrial capacity taking place due to government investment incentive programs.

The Decision Routine-Capital II

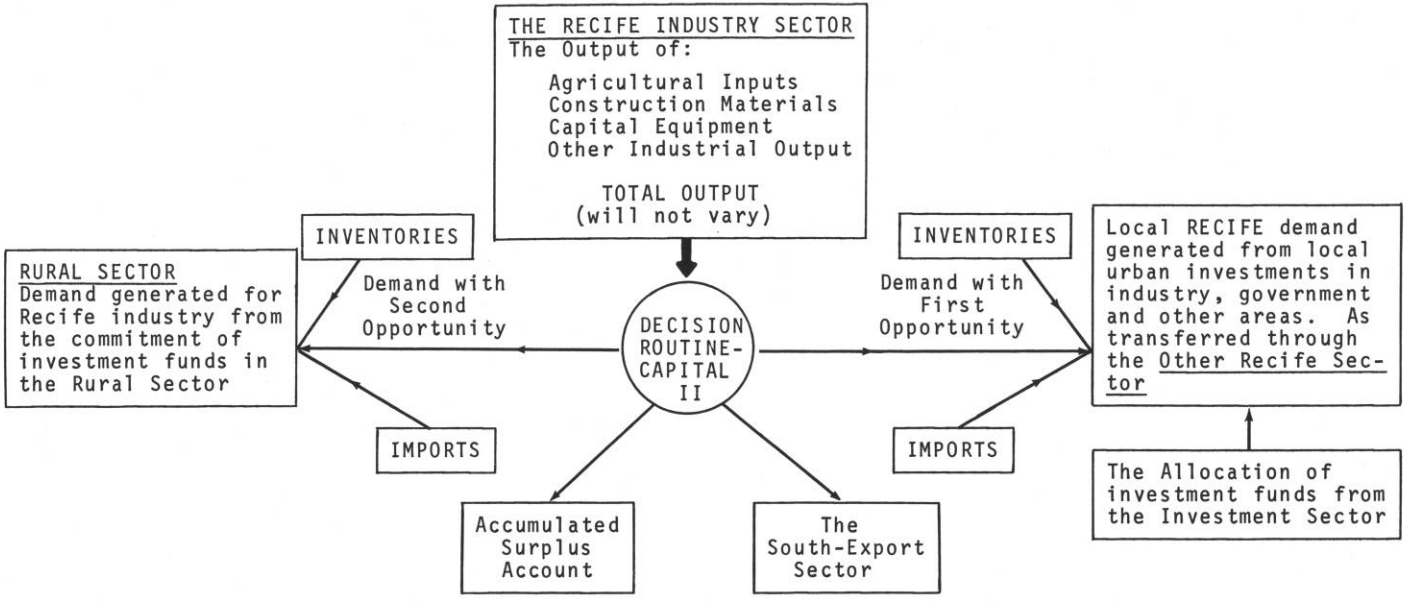
Capital II, another PER, brings together three sectors in the model: the Recife industry sector, the other Recife sector, and the rural sector (see Figure 11.7). The purpose of this routine is to analyze the impact of investment expenditures on the region through the allocation of the output of investment-oriented products for the following Recife industry types:

1. Farm input production
2. Construction material production
3. Capital equipment manufacturing
4. Other Recife industrial output

The Capital II routine provides the mechanism for distributing the given output of these four types according to a specific sequence of allocation. Each industry type has demand placed on it by the rural sector and investment demand transferred through the other Recife sector.

In the rural and other Recife sectors, a "potential or desired" demand for the products from Recife is determined. The Capital II routine compares this demand with the supply available. Given the output of any one of the four industry types, the local demand is given first priority; if a surplus exists after local demand has been met, then the rural sector demand is given the opportunity to purchase from local industry. If output remains after all local demands are fulfilled, the remainder is exported or goes to an accumulated surplus account. If at any point demand exceeds supply, the remainder of local and/or rural demand is

Figure 11.7 Decision Routine-Capital II--The Interaction with the Other Economic Sectors in the Model



note: All flows except where noted are finalized by this decision routine.

fulfilled through importation. Appendix B develops the explicit sequence of computations for this routine.

The Investment Sector

The investment sector in the Recife Systems Model focuses the planner's attention on the sources, applications, and effects of investment in the economic region. Investment is defined as the creation, modernization, or replacement of the capital stock of the system. Essentially, capital formation corresponds to increases in the capacity of various production activities, including manufacturing, processing, distribution, social or economic infrastructure, or education.

Into this investment sector flow all internally generated funds which are available for investment from all other sectors in the model (primarily undistributed profits and depreciation) and any exogenously available funds placed in the system. The impact of the investment sector on the other sectors centers on two points:

1. It focuses the attention of the user on all investment decisions in the model, thus forming the central framework for the analysis of reform options through the determination of investment costs and the effect of changing policy variables associated with a reform program on the behavior of the system.

2. The second function of the investment sector is to provide the information to complete the "economic flows" necessary to a model solution. These flows are the investment-oriented expenses for capital equipment, construction materials, and labor. By definition, virtually all demand for capital equipment and construction materials arises from investment, and a major portion of final consumer income is generated from investment-related expenditures.

An example of these two effects is an investment taking place for increasing capacity in an industrial enterprise. The level of investment is a cost which must be known in measuring the effect of that change in capacity. The first direct effects on the economy, however, enter as "construction effects" created by the demand for labor, construction materials, and capital equipment (and any interest income generated from the investment). These enter the model as explicit economic flows through the other Recife sector and demonstrate the second effect listed above. These are direct demands placed on the economic region and must be fulfilled locally or through importation. Their level, duration and location of purchase certainly influence the

evaluation of the initial investment. Finally, with the creation and use of the capacity, certain technical relationships may be altered (such as technical coefficients for labor and raw materials, location of the purchase of material, and prices).

The basic sources of investment funds are private and business savings, local and federal government funds, and foreign funds. Of the total funds available for investment, their applications are in public and private investment, net importation of goods, and hoarding or disfunctional investments (such as luxury apartment buildings). The following equation illustrates the relationship:

Private and business savings	+	Government funds after all costs	+	Foreign assistance	=
Public investment	+	Private investment (productive)	+	Net importation of goods (mainly capital goods)	+	Hoarding or disfunctional investment

Figure 11.8 describes the potential sources of investment funds from both internal and external sources for ongoing investment and exogenously stimulated investment. Given these sources, there are various applications or types of "investment" which can be made with the available funds. A given application has various effects on the economic flows in the model and the basic input parameters used in the model.

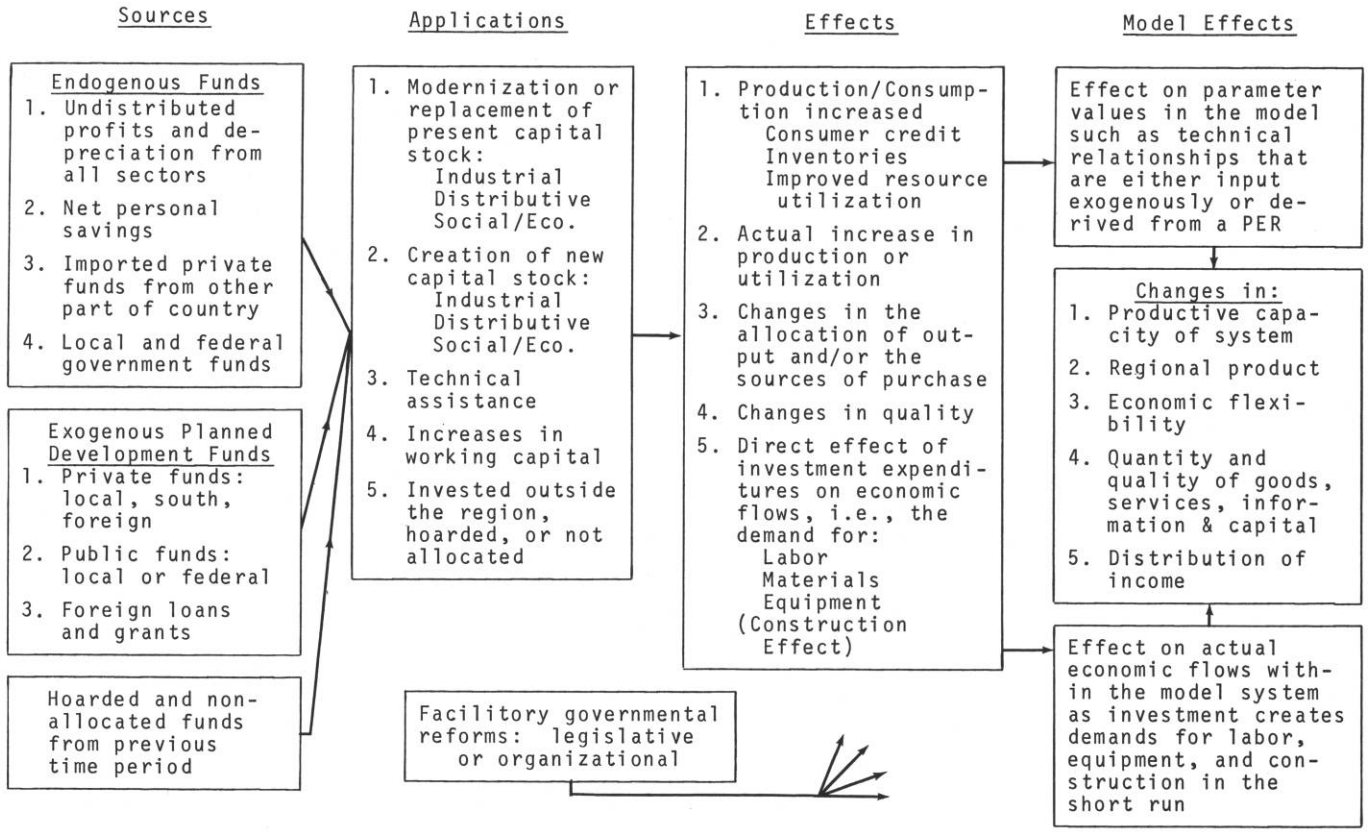
The figure does not break down the sources, applications and effects by sector. Within each internally generated source of funds are those funds directly generated from each of the sectors in the model and the types within sectors. Each application and effect must enter the model through a specific sector and sector type.

Structural Limitations in the Model

The flexibility which the planner entry routines offer to the model is significant. There are, however, certain very important structural limitations which must be considered when evaluating the effectiveness of this model.

The Recife Systems Model, like any model-building exercise, faces the general problems of data requirements, measurement, and quantification of behavioral characteristics and action. Certain of the latter limitations have been offset by the use of PERs. How well these limitations are dealt with can be assessed only

Figure 11.8 The Investment Sector--Sources, Applications and Effects of Investment in the System



after a thorough understanding of the model is obtained and an analysis of results completed.

Throughout the development of this model, two problems have appeared repeatedly. The first is the problem of the aggregation of flows and the compatibility of these flows between sectors. The definition of units and prices is dependent on how much aggregation takes place. The task of clearly defining units and prices is made more difficult as the degree of aggregation increases.

The second major problem area is the use of a sequential solution to the model's sectors. This has forced certain assumptions to be made on the ordering of economic activity in the system under analysis. The problems of order are less acute in the use of a simultaneous solution, but the size of the model and the desire to retain flexibility in economic assumptions made it desirable to use the sequential technique.

The description of the structure of the Recife Systems Model is complete. It is now important to discuss the methods of using this model in the analysis of market reform programs within the relevant economic system.

Using the Model--A General Description

The purpose of the Recife Systems Model is to provide a tool for the development planner to analyze the impact of market process changes within Recife and its four-state foodshed. A series of simulations were undertaken, the results of which are reported in Chapter 13 of this report. The purpose of this presentation is to demonstrate how the model can be used. There are a number of steps which must be taken before and during the actual simulation of the model. Each of these steps is listed below and briefly analyzed.

1. Determination of the reform options to be implemented--their character and timing.
2. Evaluation of the resources necessary for implementation. The types of resources, the level of use, and the timing of use are important considerations.
3. Valuation of input parameters for the current system and the base run simulation.
4. Determination of points of entry into the model for planner use and the transformation of reform options into parameter value changes.
5. Simulation of the reform option using the Recife Systems Model.
6. Evaluation of the results relative to the performance measures to be used.

The Determination of Reform Options

Reform programs must be explicitly defined for analysis utilizing the Recife Systems Model. The determination of the types of reforms which are illustratively simulated in the present model is derived from the results of the survey research conducted in Recife.

The model is best suited to analyze reform programs oriented to both rural and urban distribution in order to assess their impact on distribution, consumer demand, and supply interrelationships. Reform programs may center within one sector of the model in order to test their effects on that sector and interdependence with other sectors in the model. Or, reforms which are inter-sectoral in nature can be implemented to test the impact of a more comprehensive change program.

In structuring alternative reform programs for analysis, it is possible to use the "building block" approach by simulating one small reform package, then incorporating larger programs while increasing the magnitude of change in the system. In the analysis of the costs and benefits of successively more inclusive reform programs, the point is usually reached where the investment costs show decreasing returns. This should assist the planner in determining the size and scope of reform programs to be implemented. (This method is used in Chapter 13 to illustrate the use of the model in development planning.)

The Evaluation of Resource Needs

Intervention into the system for the purpose of change can be made through the direct investment of money, technical assistance, or through government action.

Reform packages must be developed which incorporate a variety of priming actions such as supervised credit, technical assistance, investment incentives, etc., into a viable program of action. The planner must determine that combination which he feels will achieve the desired goal, determine where in the system to use these tools, ascertain the timing or sequencing of action which will obtain maximum results, and develop the expected costs and timing of costs of implementing the reform.

The Valuation of Input Parameters

Three categories of information required to carry out a simulation run with the Recife Systems Model are: (1) the data for the

description of the current system, (2) estimates on how that system is expected to change over the relevant time period without the institution of the reform programs, and (3) the changes in parameter values which arise from the implementation of the particular reform options being tested.

Parameter Estimation for the Current System - Values for all parameter inputs must be determined for the current system as a basis for using the model. There are approximately 1,200 parameter values which must be given to the model each time period of a simulation. To a large degree, the accuracy of their valuation determines the accuracy of the model in predicting the impact of reform changes.

This model presents a major step forward in the valuation of these base parameter values. From the outset of the research, an effort was made to build effective interaction between the survey research and the process of building the model. In this way, the model could provide a framework for the survey research, and the research could provide information on the general structure of the system and, importantly, much of the data used in estimating these base parameters. This integration between the modeling effort and the survey research has been quite effective, and 80% of the parameter inputs are derived directly from survey results or a combination of survey results and other information sources such as federal, state, and SUDENE census and survey publications. Research staff and local Brazilian officials provided the informed estimates for parameters on which no other source was available and modified available information where it was not directly compatible with parameter definitions.

Parameter Estimation for the Base Simulation Run - The second step in the determination of information requirements is evaluating which parameters are expected to change in the system without the implementation of reform programs. This is very important because all reform simulations over a given time period must be compared to a base simulation run over the same time period in order to realistically assess the effects of those reform options.

Some of the parameters which can be expected to change are: total income to each consumer type, the natural shift in shopping behavior, the rate of growth in industrial output and rural output, and relative prices.

In determining the degree of change in the current base parameters, the survey research again played an important role. Because of the dynamic nature of the economic system, historical data was not extensively used. (In fact, very little was available.) By definition, parameter estimates projected into the future are less exact than those made for the current system and must represent the best expectations of researchers and planners on how the system will change over the relevant time period (usually five years).

Parameter Estimation for Reform Options - Before the simulation can be conducted, the reform programs must be translated into parameter values at the potential points of entry into the system. Most parameter inputs may be altered to reflect expected changes caused by a reform option (some technical parameters would not be changed). But of the 1,200 input parameters, only a relatively small number would likely be changed in simulating any particular reform program.

There are several general areas where the planner must consider intervention into the system in order to effectively evaluate the impact of a reform on the system.

1. Technical coefficients. Technical coefficients relating the amount of input needed per unit of output enter the model in each sector. In the consumption sector, the average propensity to consume is a technical coefficient. In the other sectors, the labor coefficients may be of special interest.

2. Sources of purchase proportions. Given the value of an input, these parameters determine where that input is purchased. These parameters determine the degree of intra-sector transactions, inter-sector flows, and the level of import dependence. In the consumption sector, the average propensity to shop is such a parameter. It splits the demand for food between the different types of channel outlets in the distribution sector. Similar parameters were used in other sectors to indicate input purchase sources.

3. Within the distribution sector, there are three other points of intervention which are especially important to the general types of reforms suggested by the market development approach: relative price indices between distribution outlets, level of gross margin, and the proportion of spoilage or loss.

4. In the rural sector, important consideration must be given the five special modern-traditional types of rural output. The yield rates and amount of land in cultivation are the basic inputs required.

Also, on-farm consumption rates, on-farm spoilage, rural distribution spoilage rates and margin levels, and the proportional distribution of rural output are important factors to consider in the implementation of commodity-oriented reform programs.

5. The last general area of intervention occurs in the Decision Routine-Consumer I. For the three product categories (non-processed food, processed food, and consumer goods) supplied by the local Recife industry sector and the rural sector, a careful examination of the alternative decision rules shows that a significant amount of flexibility is permitted. The value of the entry points generally falls between allowing the local supply sector (industry or rural) to react fully to any surplus or deficit and allocating any deficit to increasing importation and any surplus to increasing accumulated inventories.

Once the parameters to be changed are determined, the degree to which they will change over the time period must be decided. That decision depends on the types of changes indicated by economic research, the theoretical underpinning assumed, and the expectations of the development planners. These estimates are less precise than either of the first two sets of parameter values. The speed of computer simulation, however, permits more than one set of estimates to be evaluated. Thus, while the model in any given run is deterministic in character, simulating high and low estimates on key variables around a "best estimate" gives results which would contain a range of expected values for the important performance measures chosen for evaluation of the impact of the reform program.

Simulation of Reform Options

The Recife Systems Model is constructed as a set of individual sectors and then linked by the inter-sector flows of goods, services, labor and capital which take place in the system. The explicit computer program for the model and the flexibility built into the model through the planner entry routines permits the model to be used in more than one way. The type of use to which the model is put will, of course, depend on the character of the analysis and results desired. Below is a list of some of the ways in which the Recife Model can be simulated.

1. The model is so structured that an individual sector or group of sectors can be simulated separately.

2. Since the time period is arbitrary, the model can be used for very short-run forecasting by assuming time periods of one month or one week, or it can be used for longer-run analysis by assuming that each time period is a year or more in length.

3. Currently, the model deals with all goods flowing in the system. It is feasible to narrow the scope of the model to deal with one product or group of products without changing the structure.

4. Through sensitivity analysis, a given parameter can be tested in order to understand the effect of various degrees of change in that parameter on the system in general. This type of analysis is useful in determining the accuracy of estimation needed for a parameter.

Evaluation of Simulation Results

Performance Measures - The success of this modeling effort depends to a large extent on effectively relating the roles of the planner, researcher, and modeler. In order for this interaction to take place, a set of performance measures must be specified. The purpose of these measures is to present an explicit statement of the crucial factors by which alternative reform options can be evaluated. In essence, the model must be able to give the planner a set of comparative measures of performance relative to developmental planning goals.

As described earlier, only economic variables are included in this model. Thus, only economic measures are used in the analysis of alternative reform options. The performance measures used here are only a sub-set of those employed in the final decision. The social, cultural and political effects of the reform must be included in that final decision. However, knowledge of the economic impact of reforms can often be used by the development planner in evaluating the expected social and political effects of the proposed reform programs.

The performance measures which systems analysis and this model emphasize center around the concept of flow. Specifically, the emphasis is on the flow of goods and services through the system as opposed to the level of stocks in the system (i.e., quantity of storage, number of dwelling units, etc.). Thus, the volume of flow, the rate of flow, the mix of the flow, and the distribution of the flow of goods, services and income through the system form the foundation on which the performance measures for this model are built. Below is a list of a few of the potential measures which this model can give as results. The explicit choice of criteria depends on the information which the planner feels is important in making a decision.

1. The total value of money income generated, its distribution and rate of change by consumer type and economic sector.

2. The value of real incremental income generated to final consumers from shifting buying behavior and changing relative prices.

3. The absolute level of importation and the rate of change in the value of importation by sector (import substitution).

4. The level of spoilage and/or loss in the system by sector.

5. Capacity and capacity utilization.

6. The level of labor demand by sector.

Evaluation and Action - Once the simulations have been run, the results must be evaluated relative to the performance measures developed. Estimates of the internal system costs and benefits derived from the reforms are then compared with the investment necessary to implement the reform. The results give a representation of the economic feasibility and desirability of the given reform. The development planner can then assess the economic implications of a reform in comparison with its social and political implications. A decision can be made to act on the reform, to defer action until parameter estimates are more accurate, or to wait until research reveals more fully the functional relationships within the model. In short, the decision-maker (model user) can act or defer action; if action is deferred, improved information may be sought. (Improved accuracy must be balanced against the added costs of obtaining the better information.)

The Recife Systems Model offers a unique flexibility in the type of evaluation which is conducted on the results of a simulation run. The computer program for this model permits exact computation of these criteria from other internally generated results in the model. For a simulation of five time periods, there are 310 pages of detailed economic information. The structure of the economy is presented in detail for each component within each sector in the system, and summary statements are developed. Cost-profit schedules for the distribution sector and the industry sector are presented, rates of changes on most parameters and calculated results are computed, etc. Further, in the Decision Routine-Consumer I, the decision rules are presented in text form accompanied by their use and effect on the system.

Thus, the performance measures give an overview of the results of the simulation, but there remains the flexibility to analyze in detail any portion of the economic system. This becomes important when considering the differential impact of refcrms within a given sector. For example, the results of one of the marketing reforms showed the total wages generated in the distribution sector to be only slightly lower than what could have been expected without the reform. A careful investigation of the detailed printout showed that modern food outlets had gained a large increase in wages and traditional outlets had lost a large amount of wage income. To the planner who is trying to ascertain the "real" economic impact of a reform and also judge some of the non-economic results, this knowledge of the differential result on wages would be important.

CHAPTER 12

A GENERAL SUMMARY OF ISSUES, CONCLUSIONS AND RECOMMENDATIONS

The reader of the previous chapters has seen that our examination of the exchange process reaches deeply into many aspects of society. It is useful now to summarize the issues that have been studied, the evidence that has been generated, and the recommendations that have been offered. This chapter attempts to set the stage for viewing marketing changes in a "systems" context and for utilizing the general systems simulation model for examining selected policy issues.

Development Goals and Market Processes

It was argued in Chapter 1 that market processes are important components in the more general process of economic and social development. Furthermore, market processes, when viewed as the coordinating and regulating mechanism of a socio-economic system, become increasingly important as that system shifts from a traditional agrarian society toward an urban-industrial society. But market processes have been relatively neglected by development planners. This is in part because marketing transcends the boundaries of the conventional sectoral planning approach. Also, market processes deal with aspects of human activity that can only be understood within the context of a broad social science perspective.

There are several widely sought economic development goals significantly affected by market processes. These goals, which were described in Chapter 1, include the following:

1. Growth in gross product
2. Full employment of labor
3. Rising levels of productivity
4. Less concentrated income distribution

Market processes can actively contribute to the achievement of these development goals in a variety of ways. However, some specific contributions of market process improvements in developing economies can be suggested:

1. Reduce costs of present marketing services through improved coordination of the production-marketing system.

2. Expand effective demand by reducing relative prices of local products, such as food, which are consumed by low-income people who spend a high proportion of their income on food.

3. Improve and expand marketing services to meet the increasing demand for greater product variety, changing proportions of products, and improved product quality.

4. Stimulate expansion of food production through input market improvements and the encouragement of use of new technologies by providing better product market assurances to farmers.

5. Stimulate production, marketing and consumption of locally produced non-food consumption goods to absorb the discretionary income resulting from the relative decline in the cost of food.

A Diagnosis of Market Processes in the Recife Foodshed

The marketing reform strategy that evolved in this research project begins with a diagnostic study of the existing production-marketing system in particular market areas. This was done in Recife, Brazil, in order to obtain information for use as a basis for policy and planning decisions. Attention was focused on urban food marketing in Recife and on the production and marketing of selected agricultural products and farm inputs in the Recife foodshed area. An attempt was made to identify socio-economic barriers to expanded output and increased productivity. On the basis of the information gathered by the research activity, a series of interrelated conclusions were reached concerning the existing marketing system and the possibilities for implementing changes that would contribute to the achievement of development goals. A set of conclusions and recommendations for marketing reform programs was formulated. They are summarized below and recast as part of an overall marketing reform strategy.

Chapter 3 presented evidence that industrial development programs now being carried forward in the Northeast are, in fact, creating the capacity to produce locally consumable goods and services. Yet effective demand and institutions to market this industrial production are not being fostered at the same rate. Industrial capacity is certainly a necessary condition for development, but capacity alone is not sufficient to achieve take-off. The industrial development programs of the Northeast do not now have a strong emphasis upon improvement of marketing. Yet there appears

to be no specific reason why this limitation on development investment needs to continue. Efforts should be made to foster market planning and marketing institution development to complement the industrial production expansions being fostered by the 34/18 program and by other development strategies now operating in the Northeast. This research suggests a potential for expanded market outlets for industrially produced farm inputs and for low-cost consumption goods for both rural and urban low-income families.

Chapter 4 presents considerable evidence that urban consumer behavior is such that changes in food retail marketing institutions and practices would be accepted by a substantial percentage of the shoppers. The average propensity to consume food for different income groups varies substantially, so that a lowering of the prices of staples would expand demand for local consumption goods, particularly food. A detailed study of consumer food expenditures in Recife revealed that the lower 58% of the families spent approximately 70% of their income on food (Table 4.4). The next 24% of families spent 57% of their income on food, while the over-all mean was 56%.

Chapter 4 also substantiates the contention that consumer shopping behavior and attitudes toward large-scale, low-price outlets is such that a significant share of low-income consumers appear willing to shop in large-scale discount supermarkets when these outlets are available and when these consumers are encouraged to utilize them. However, it is clear that the self-service stores are patronized more intensively by those who spend more on food, and that "price" is the principal reason why self-service shoppers prefer these outlets. But lack of a convenient location deters shoppers from using these outlets.

In contrast, purchasers in neighborhood stores indicate that convenience is the overwhelming reason for their use, and that price is the critical reason why shoppers prefer not to utilize local stores for the same types of products generally available in the self-service outlets. Permanent markets and street fairs are similar in many of their attributes, and consumers appear to shop there most often because of the quality, variety and price of products. From other information, we know that the products regularly purchased in self-service and neighborhood stores tend to be dry grocery products, while perishables are purchased in permanent markets and street fairs. The self-service store, permanent markets and street fairs are used for the major once-a-week shopping expeditions, with the

neighborhood stores for fill-in purchases for higher income people; but the lower income people find themselves tied more fully to the neighborhood stores and street fairs for the small, and necessarily more frequent, purchases that they make. Thus, ignoring transport costs, by shopping at the more expensive but more convenient neighborhood store, the poor in effect pay more for their food.

Traditional single-product retail institutions do not vary their margins inversely with turnover to induce low-income consumers to purchase staple low-cost consumer goods, while encouraging higher income consumers to purchase impulse items carrying higher margins. Such options are clearly limited to the larger multi-product outlets. Also, because of scale economies, these large outlets can usually offer lower prices on the less frequently purchased goods than can the traditional single outlet stall merchants, even with low margin, promotional pricing of staples. Chapter 5 documented this conclusion.

A survey of Northeast Brazil farmers revealed that rural consumers have very high aspirations to increase their consumption of food and urban-produced products. Thus, the two-thirds of the total population of the Northeast who live in the rural areas, though their incomes are low, form an important and expandable market for urban-produced consumption goods.

In the large urban centers, food marketing reforms appear practical and likely to reduce prices and expand sales. For example, discount supermarkets are getting started in Recife and are expanding as rapidly as their available investment capital and management skills will allow (Chapter 6). The discount supermarkets are affecting the price structure of other self-service retail outlets as well as nearby traditional stall retailers (Table 6.1). The discount supermarkets have been attempting vertical coordination to reduce the number of transactions and to cut costs of acquiring major food items. They have used their market power to cut distribution costs for rice and eggs and are contemplating similar action on other items.

Traditional stall and neighborhood store merchants appear to be responding to the programs of CARE, a public agency under the administrative direction of CANESA/SUDENE that is operating a new wholesaler food distribution center in Recife. Given the mounting pressure from discount supermarkets, these traditional merchants would very likely respond to further organization of food distribution activities. However, unless programs are stepped up to assist these urban marketers, their reaction to the rise of discount supermarkets may be negative and constitute a serious problem.

The evidence collected in the five rural surveys in Northeast Brazil indicates that production of staple foods is still in the early stages of technological transformation (Chapters 7 through 10). Most farmers continue to use traditional production methods. Crop yields remain low when compared to other areas of Brazil. However, total agricultural output has been increasing as the area cultivated is expanded.

A central problem of agricultural development in the Northeast is to stimulate technological and organizational changes so that larger volumes of products can be produced and sold at lower costs. This would improve the diet of both rural and urban consumers and raise rural income. Currently, substantial quantities of basic foodstuffs flow into the Northeast from southern Brazil. Thus, on items such as rice and beans, increased local production could replace these imports without encountering serious demand constraints in Northeast markets.

Major reforms will be needed in both the agricultural input and product marketing systems to stimulate a more rapid rate of agricultural development. Modern farm inputs are not generally available in local rural markets. Chemical fertilizers could not be purchased in any of the rural areas surveyed (Chapter 8). Pesticides were usually available, but costs were high. Tractors and certain items of farm machinery were available in the São Francisco and Irecê areas, but service and repair parts were serious problems. The prices of all agricultural inputs tended to be high, reflecting, among other things, the 18% (ICM) sales tax. Although subsidized credit is available to farmers through government banks, there is still considerable credit rationing. Given the current low levels of farmer income and the necessity of spending a high percentage of this income on family living expenses, further expansion of production credit will be necessary to support increased use of modern farm inputs (Chapter 8).

The rural assembly markets for staple foods are characterized by many small-scale operators hampered by poor information and transportation networks (Chapter 9). A market-sharing ethic tends to further reduce the level of competition, although no significant concentrations of market power are readily apparent in assembly market operations for staple foods. The itinerant trucker-assembler has become an important competitive element, performing an arbitrage function in the rural marketing system. The apparent need is for increased scale of assembly market operations and a reduction in the

number of transactions occurring between the farm and the urban retail market. This will require improved capitalization of marketing firms and better vertical coordination of market channels through improved information flows and changes in organizational structures.

The lack of credit showed up in two ways in the product markets. Farmers (especially rice, bean and cotton farmers) frequently borrowed from assemblers, pledging the delivery of their crop at harvest time, generally at prices below the prevailing market level. Also, assemblers frequently took delivery of products from farmers but deferred payment for a month or more. Thus farmers were providing much of the financing for inventories carried by assemblers.

The study of Recife's fluid milk marketing system revealed that consumers were dissatisfied with the quality of the milk and its uncertain availability (Chapters 4 and 9). Improvements in handling practices at all levels in the production, assembly, processing and distribution channels are essential to market expansion. Much of this could be carried out with fairly low capital investments, since the pasteurizing plant has considerable unused capacity (Chapter 10).

The personal characteristics, attitudes and communication linkages of farmers and rural market operators pose formidable barriers to market reform programs. Literacy levels are generally low. Farmers have little knowledge of modern agricultural technology. Attitudes of both farmers and assemblers reflect a traditional view of their environment. A high percentage have little hope of improving their lives by their own efforts. The farmer's communication linkage to the outside world is centered in his frequent participation in local *feiras*, although radio linkages are utilized fairly frequently. However, much of his market information reaches him by interpersonal sources, and he has few alternative channels to use. The heavy use of interpersonal single-channel information networks makes him dependent on other marketers for many decisions, and hence subject to some exploitation.

On the basis of our research, it appears that some of the rural areas studied would respond more rapidly to a program of modernization than other areas. Conditions are probably most favorable to modernization efforts in the São Francisco rice area. Recife milk producers would also be likely to respond to market improvements. The bean producers in Irecê and Alagoas form an intermediate group,

with the Irecê producers evidencing greater progress at this point in time. Conditions in the manioc and cotton areas appear to be less favorable for quick results from a modernization program (Chapters 7-10).

Summary of Recommendations

The issues and evidence just presented lead directly to recommendations for a marketing development program designed for Recife and its foodshed. It is convenient to think of the marketing development program in two related parts: urban marketing reforms and rural marketing reforms.

Urban Marketing Reforms

The urban food marketing system in Recife is already in the early stages of modernization. Therefore, the recommendations outline a series of actions which would accelerate and give direction to changes currently in progress. The urban food marketing reforms, along with related efforts to improve the urban-rural flow of both consumption and production goods, are emphasized as necessary conditions for accelerated economic development.

A basic recommendation is to make available investment funds and technical assistance for marketing activities. At present, businessmen in Northeast Brazil have to borrow at well above the prime interest rate in order to secure funds for marketing purposes. There is no major public institution with a mandate to foster private marketing activities, and private banks presently lack the resources to assist adequately in this area. Also, industrial development programs should be modified so that a portion of the funds could be directed to the development of marketing systems for manufactured products (Chapters 2 and 3).

Four interrelated recommendations to accelerate the modernization of the Recife food marketing system are proposed:

1. Encourage further expansion of discount supermarket operations through a loan and technical assistance program. Where loan applicants have experience and proven success in store operations, little technical assistance would be required. However, for new and unproven operators, technical assistance should accompany loans for such purposes as facilities, equipment, inventory and vertically coordinated procurement programs reaching back to rural areas.

2. Develop a procurement, warehousing and merchandising program for operators of small- and medium-sized food

stores. Either a retailer-owned cooperative or a voluntary chain warehousing program with loans and technical assistance provided by a public agency could create the appropriate warehousing facility for dry groceries as well as some perishables. Funds would be needed for equipment and facilities, although at present land is set aside in the CARE food distribution center for such a program. The present wholesale stalls are too small to provide the warehouse space needed for the mixing and bulk-breaking operations. Technical assistance would be required to guide modernization of in-store facilities and improvement of store management and warehouse operation. Inventory loans will also be necessary (Chapter 6).

3. Assist *feira* and public market stall operators in coordinating product procurement and efforts to improve and promote their markets. The critical need, of course, is for more efficient procurement of supplies with improvements in the physical facilities of the retail outlets. The promotional effort would help in the improvement in retail sales, but would serve principally to encourage cooperation with the procurement program. Hence, sufficient sales would be achieved to make the capital applied through this program more efficient than the present highly fragmented system of product acquisition (Chapter 6).

4. Initiate a consumer information program to provide food shoppers with information on nutrition, product use, retail food prices and shopping practices. Mass media, especially radio, should be used to reach the shopping audience. Basic instruction on nutrition and food buying should be introduced into school curricula (Chapters 4 and 6).

Rural Marketing Reforms

Given the traditional nature of agricultural production and the low levels of productivity, highest priorities for marketing reforms should be focused on agricultural input marketing. This must be undergirded by an accelerated program of research to develop and test new and improved varieties of food and fiber crops and to determine economical rates of application for fertilizer and other purchased inputs.

Three interrelated agricultural input marketing recommendations were made in Chapter 10:

1. A program to develop, test, multiply and distribute improved varieties of seeds of staple food crops such as rice, beans and corn.

2. A program to test crop response to fertilizers under differing conditions, followed by a demonstration program and the development of a distribution system.

Also, to encourage the use of fertilizers, it is recommended that the price be reduced by exempting it from the ICM circulation tax and that a temporary price subsidy be offered.

3. An expansion and modification of the rural credit system to facilitate farmer purchase and use of modern inputs.

Three product market reform recommendations were made in Chapter 10:

1. The existing price stabilization program should be expanded and strengthened to assure farmers of remunerative prices for staple food crops.

2. A road improvement program for village-to-market center connecting roads and, where possible, farm-to-village roads.

3. Develop a more adequate market information system linking major consuming centers such as Recife with interior assembly market convergence centers.

These three reforms are fundamental to the further development of the production-marketing system for agricultural products in the Northeast. However, it is suggested that greater benefits can be realized by initiating these programs in the rice and bean producing areas before similar efforts are attempted in the cotton and manioc areas.

A special set of recommendations was designed to improve the CILPE milk processing and distribution system in Recife. Additional investment in bulk storage and transport equipment to collect and haul milk to the Recife plant was recommended. Due to scale economies, significant cost savings will accrue with the improved handling equipment. Also recommended was a more stringent procedure for testing quality as milk arrives at the collection stations. A reorganization of the milk distribution system coupled with a promotional program by CILPE would complete the package of recommendations. The reform package should improve the quality of milk and expand fresh milk consumption in Recife. At present, only 30% of the total milk consumption of the city is fresh milk, even though it sells at a lower price than powdered milk.

Actions Needed to Implement the Marketing Development Programs

The initiative for implementation of the recommendations in this report rests largely with SUDENE, the Northeast Brazil planning and development agency. The suggested actions do not repre-

sent a major change in policy, since SUDENE has repeatedly recognized the importance of marketing in its Master Plans. The First Master Plan (1961-63) stated, "Solution to the food supply problem in these [urban] centers is a prerequisite to the success of any industrial policy." The Third Master Plan stated the problem more explicitly: "The deficiencies of the marketing and distribution system therefore constitute a serious obstacle to agricultural development ... [and] also prejudice the development of the economy as a whole."

This research project has identified some of the deficiencies in the existing marketing system and has indicated some specific actions which might be taken to remedy these deficiencies. However, some critical questions remain for SUDENE and related agencies that might attempt to implement the project's recommendations. These questions are as follows:

1. Do all of these programs have to be accomplished simultaneously?

2. Can (or must) some programs get started first?

3. Are there differences in the lead times required to initiate various programs?

4. Because resources are scarce, how do economic consequences of marketing development strategies rank when weighed against alternative development strategies?

5. Will the level of employment and income distribution be changed as a result of marketing development programs?

6. What levels and kinds of resources are required for these programs?

In summary, the question is: How do marketing development schemes compare and compete with alternate development strategies? Even more important, how do the recommended marketing reforms complement other development efforts?

It should be noted that we can only illustrate the kinds of programs needed. This project did not have the resources to make detailed feasibility studies for specific action programs. Further, it would have been inappropriate to conduct feasibility studies prior to general diagnostic studies. Thus the level of local capital, foreign capital, and technical assistance required for each recommended program over the next several years is a task that must wait until political priorities are established and the goals of marketing development are placed in the context of over-all development strategies for the Northeast.

Finally, the regulatory reforms needed to foster marketing development and the individual marketing programs to which they are related need to be further specified.

Some of these questions will be considered in the next chapter, using in part the simulation model of market processes described in Chapter 11.

CHAPTER 13

PROGRAMMING MARKETING DEVELOPMENT

Viewing the development problem from the perspective of the marketing process provides some unique opportunities to evaluate the impact of a wide variety of reforms. This is so because of the pervasive, cross-sectoral linkages of market processes in any economy. It is equally true that consideration of development from the marketing viewpoint poses special problems of organization for policy implementation. In this chapter we will consider four topics: first, the decision processes involved in programming marketing development; second, the uses to which this study might be put; third, an illustrative evaluation of alternative marketing development strategies based upon simulations utilizing the general systems model; and finally, some of the organizational requirements of market process integration.

The Decision Process

The conclusions and recommendations detailed in the previous chapters reveal a wide variety of actions that might be taken to foster development in the Northeast. The question is, of course, which actions to pursue and in what order. Four interrelated issues seem to deserve consideration when evaluating the choice of action programs.

First, it is useful to consider the general systems model and the research into the market processes of the community as a "forum" for discussing a broad range of basic development problems and options. Because marketing stresses the interdependence of the economy, much of what we have considered as aspects of the market process are, in fact, taken into account when other approaches to development issues are followed. Yet the marketing viewpoint is unique.

For example, industrialization has been a key element of all SUDENE plans. Marketing analysis stresses the high degree of interdependence between industrial growth, agricultural progress and the creation of effective demands for industrialized products in both the rural and urban sectors. Similarly, the original diagnosis of Northeast development problems which led to the creation of SUDENE featured this urgent need for lower real food prices in the cities.

This concern has been sustained throughout SUDENE planning. The marketing viewpoint provides an avenue of attack on the food price problem which deals with the structure and performance of the urban distribution system and its influence on the relative price of food in the cities and the supply of inputs to agricultural producers.

When the systems model and research into market processes are used as a forum for discussion of development, the decision-makers will be able to evaluate not only the consequences and inter-relationships of actions proposed, but more jmportantly perhaps, compare and discuss the assumptions underpinning their specific plans for development.

A second requirement prior to evaluating the actions needed to implement market development is establishing the relative priority of marketing reforms along with other development options. The development of production capabilities in industry as well as agriculture must be assessed along with human resource development and the external requirements of the community, such as export and import development and control. Unless the integration of market processes is given an important role along with other development tasks, it is our opinion that the community may very well lag in growth of income, and the distribution of that income may not be consistent with the basic goals of economic planners.

It may plausibly be argued that marketing development in the Northeast is inseparable from other development tasks. The expansion of productive capacity and output in industry and in agriculture is simply not in itself a definition of development. For development to occur, the relative prices of capital goods, consumption goods and food must change appropriately. There is no *a priori* basis for presuming that these prices will change as required in the absence of fundamental reforms in the marketing processes. Indeed, the traditional marketing processes of the region have demonstrably hindered the achievement of the gains expected in terms of income and income distribution from increased regional product. Thus, marketing development may legitimately be viewed as part and parcel of the over-all development process and a necessary integral element of industrialization and rural modernization efforts.

Once the ranking of the priority of marketing in relation to other development activities is established, the process of decision-making can get under way. Most critical issues involve several decision-makers, drawn from development agencies, financial

institutions, and private enterprise within the community. Decision-makers in these three broad categories of development responsibility need to have some degree of concensus as to the role of marketing in development. Such agreement need not be extremely detailed, nor is a high degree of conformity to any preconceived doctrine essential. Fundamentally, however, there should be a mutual interest in fostering exchange processes, principally through the private sector, with facilitative actions being taken by governmental or quasi-governmental agencies.

An appreciation of the differing propensities to shop and consume among different income levels within the urban community is also relevant. An awareness of the problems of encouraging urban and rural marketers of consumption goods to expand their operations by lowering prices and simplifying market channels is useful. Once decision-makers have reached some degree of agreement as to the fundamental role of marketing, then agreement as to the more specific parameter estimates involved in simulating the market process can be sought. Uncertainties and risks associated with possible variations from hypothesized levels of response to particular marketing reforms can be critical. Thus, differences in opinion as to the relative importance of specific parameter changes may result from basic differences in perspective as to the consequences of these changes.

It is only by providing a framework for discussion of the reforms in relation to the consequences for the society that agreement can be achieved among the interdependent decision-makers from development agencies, financial institutions and private enterprise. The decisions will not require public sessions involving all participants, but what is implied is that the individual decision-makers, whose judgments are critical to implementation of marketing development programs, be willing to expose their opinions and consider the probably consequences of various specific market development reforms. It is only by identifying points of concern that research information can be appropriately focused on the critical issues limiting decisions. With agreed-upon estimates of parameters, it is practical then to evaluate the costs and benefits associated with both individual marketing reforms and the collective response of the economy to a program of marketing development activities.

Uses of This Study

Early in the current research program, the Brazilian members of the study team expressed a general objection to "purely" theoretical research. Their concern was, of course, legitimate in the context of a developing community sorely pressed for professional, administrative and technical talent. The community was in desperate need of "action" programs aimed at eliminating the obvious and immediate bottlenecks to development and planning the unquestionably necessary foundations of long-term growth. The question was and still is: Can a developing area such as the Northeast "afford" to invest the resources of time, finance and personnel necessary to undertake research such as that which has been centered on the marketing process? In short, do the returns to be derived from research justify the costs, or is this an exclusively academic exercise which can ill be afforded by developing communities?

We see three broad areas of application for this research study: first, as a basis for marketing development planning; second, as a benchmark for the continuous collection of selective information which may be useful to marketing development; and third, as a new way of approaching and organizing the development task.

As a basis for market development planning, this study provides specific recommendations for action programs which involve regulating reforms, technical assistance to marketing firms, along with investment in both private and public facilities, the private investment being fostered via either supervised credit or by a permissiveness toward private investment in the selected areas identified as critical to the improvement of the marketing system.

As a benchmark for selected information useful to marketing development, this research has revealed many areas where only by gathering longitudinal information will the appropriate and necessary data be developed to reliably monitor the performance of the economy in response to reforms that are implemented. The probabilities of error in our estimates of marketing needs are evident; and the possibility of improving the estimates is, in many cases, quite clear. Thus, if researchers could continue to collect information about urban as well as rural marketing processes, the reliability with which reforms might foster development could be substantially enhanced.

Third, as a broadly new way of organizing the development tasks, the market integration approach has much to recommend itself. Utilizing the systems analysis implicit in this approach, we have

been able to shed new light on the role of the final buyer in the exchange process. Inherent in recognizing the significance of the consumer's behavior in market processes is an appreciation of the differing buying and shopping behavior associated with different income levels. Thus, the matter of income distribution becomes an explicit element in a program of market development. Usually, income distribution has been treated essentially as a political problem to be dealt with primarily by taxation and land reform policies. It is suggested here that income distribution changes can be effected by shifting the relative prices of goods demanded in different quantities by people in various income groups. Thus, real income can be changed somewhat less painfully than in the distribution reforms achieved through taxation or expropriation programs, even though the possible need for the latter type of action is not denied.

The general systems approach to internal market process integration allows other problems of development to be explicitly considered. For example, education and training will affect technical coefficients in shopping behavior as well as consumption propensities. Thus, for these somewhat narrow benefits from human resource development programs, a benefit cost analysis may be possible. Similarly, transport improvements can be evaluated in terms of their effect on cost of output actually reaching the market.

In conclusion, we believe marketing research of the type performed for the Recife foodshed can have considerable development pay-off.

Within the Northeast context specifically, marketing research of the type performed can be regarded as a timely refinement of the development planning process. When the issues and problems of the region's economy were first comprehensively diagnosed in the late fifties, certain kinds of basic development actions were immediately and obviously required. Little theoretical controversy was generated by the decisions then to emphasize the buildup of infrastructure, the acceleration of industry investment, agricultural output expansion, and later, the improvement of the human resource base.

At the current stage of Northeast development, the planning problem has become more complex and sophisticated. The number of variables which must be taken into account has increased considerably; their interrelationships have become correspondingly more intricate, and the importance of closer estimates of parameter magnitudes more urgent. All development planning necessarily involves certain implicit or explicit assumptions about operational hypotheses, the relevancy of variables, their functional interrelationships and quantita-

tive magnitudes. We are here arguing that research of the kind performed with regard to marketing is a systematic method of making most of such assumptions explicit, and then testing them against the facts of the "real" world. The general systems modeling approach enables the planner to handle a complicated set of variables which otherwise, because of sheer volume, would defy the capabilities of ordinary human intelligence.

Thus, we advocate the research approach we have followed as being suited to analysis of a broad range of basic development problems now confronting the Northeast. It is simply a more sophisticated way of dealing with problems which have themselves become more complicated.

We also believe, however, that the subject of the research, the marketing or exchange process, is directly relevant and highly important to decision-making at the current stage of Northeast development.

As already suggested, the compartmentalization of development tasks into the sectors of infrastructure, industry, agriculture and human resources was conceptually feasible at the outset of development planning in the Northeast. It is now important to pay increasing attention to the linking together of efforts in each of these sectors. From a theoretical point of view, the linkages consist of economic flows of inputs, outputs and human resources. In other words, the inter-weaving of the region's economy must be accomplished in large measure by developing marketing systems capable of performing efficiently the exchange functions between sectors, and between the rural areas and the urban centers, while also providing incentives for economic growth.

The primary usefulness of the current marketing research may thus ultimately be as a new approach to analysis of the Northeast's present constellation of development problems.

Evaluating the Impact of Market Development Programs

Reform programs recommended in the previous chapter are combined with the general systems model structure described in Chapter 11 to illustrate the uses of the model through computer simulation as an instrument capable of assisting the planner in program appraisal. The internal structure of the systems model portrays the basic market system of Recife and its foodshed. The simulations presented here are mathematical representations of the dynamics of internal

market processes based on the research done in Recife. The specific parameter estimates and economic assumptions in such areas as income distribution, consumer expenditure patterns, product distribution, and technical coefficients are generated directly from the research. The content of the reform programs was developed by the research team members, and the links between these programs and the key economic variables and relationships in the system were estimated by the research team in extensive workshop sessions. Also developed in these workshops were preliminary investment cost estimates for program implementation of the reforms. These cost estimates are presented in order to demonstrate the need to compare them with the cost/benefit consequences of the reforms arising within the system and are offered only as very preliminary estimates of the likely costs to achieve the reform goals identified by the research.

If the decision-maker wishes to utilize the model to test different assumptions about the functional relationships between sectors of the economy, different behavioral assumptions, or the impact of different policy variables, the present model structure provides the capability to accommodate a variety of changes. The basis for any adjustments in parameter values or model structure can be prior knowledge, further research to improve the accuracy of estimation, or merely the exploration of the consequences of different assumptions about consumption, distribution, production, government action, or investment. Thus, while the model can become an increasingly accurate reflection of the processes of the marketing system of Recife, it can also be used to consider the economic and social consequences of hypothetical changes which might be induced by reforms upon the workings of the market process of the community. When the planner has substituted his revised data, the general systems model can be simulated again to evaluate performance indicators.

The general systems model structure is designed to allow the planner a broad range of options in evaluating the character and magnitude of change in the economic system. The flexibility built into the general model structure permits variations in parameter valuation, in economic structure, and in the effect of policy variables on the economic system over time. Thus, the internal model structure can be utilized fully as a computer simulation planning tool only with the active participation of the planner, because he provides the final assessment of parameter values and fundamental economic relationships. More importantly, the planner is the key link between the policy variables, program implementation, and the economic process relationships in the "real" economic system.

It should be stressed that these simulations are illustrative applications. The research team members are not decision-makers for Northeast Brazil. The recommended reforms have been based upon the diagnostic research. The parameter estimates, investment cost estimates, and the estimated impact of policy variable changes are not those of the "planners," but were developed for purposes of analysis and to demonstrate the research potential of the approach. Detailed feasibility studies should underpin estimates of investment costs and the potential impact of program implementation. Thus, the anticipated results of the recommended reforms are also very preliminary estimates that illustrate what might happen if the reforms were undertaken. The purpose, then, of this section is to show how the general systems model as a computer simulation tool can be used and the kinds of results which the model is capable of giving when evaluating internal market process reform programs.

Also, it should be remembered that the model developed for this project was a large-scale model, utilizing a large-scale computer (see Appendix B). This was done because the research was designed to most efficiently demonstrate the feasibility of this approach. Later application calls for modifications in the model in order to utilize local computer facilities and much more fully involve policy makers in the use of this tool to evaluate the consequences of alternative reform programs.

The Review of Critical Questions

The evaluation of the consequences of the reform programs identified in the previous chapter does permit us to test some important questions about the impact of marketing changes upon the performance of the economy. The costs and benefits associated with specific reform programs can be evaluated through computer simulation by utilizing the general systems model. Five critically important questions are reviewed through the simulation analysis:

1. Will the labor-saving technological changes in marketing alone, such as the current development of discount supermarkets, yield an increase in income for the community as a result of the lowered prices or will the decreases in employment occasioned by the new technology of distribution more than offset the price reductions?

2. Will a combined urban marketing development program which not only supports the efforts to expand discount supermarkets but also offers technical assistance and improved capitalization to traditional food merchants yield a smoother transition and avoid

some of the unemployment consequences implicit in the development of discount supermarkets alone?

3. Will a rural marketing development program add to the effect of the urban marketing reforms?

4. Can the increases in rural demand associated with the increases in urban expenditures for foods provide an expanded market for urban industrial products?

5. Will the benefits of such programs likely offset the construction costs and technical costs associated with the programs?

The Reform Options Considered

The three reform programs chosen for this illustration are drawn from the recommendations summarized in the previous chapter. Each successive reform program simulated includes the earlier ones. Thus, these preliminary simulation applications of the systems model to market process study illustrate the probable cumulative effect of these programs over time and as they become more inclusive in nature. In order to keep within a realistically accurate "planning horizon," each of the reform simulations is "run" for a five year period. Therefore, the cost/benefit analysis and estimates of investment resource needs are appraised only for five years.

Reform Program One: Modern Discount Supermarkets - This reform "package" recommends financing and technical assistance for ten additional modern discount food operations in the city of Recife. The emphasis in these operations would be on high volume and low margins for basic food staples. They would be located to obtain patronage from the lower income classes. In addition, they would be encouraged to increase direct buying and vertical coordination of supply channels.

Reform Program Two: A Total Urban Reform Program - This reform includes the first program for modern discount supermarket operations and adds programs oriented to the current traditional operations in the urban distribution system. The effort is to make those more traditional retailers and wholesalers competitive and consumer-responsive. This program includes:

1. For street and public markets, a program for the ten largest centers for the promotion of sales through facility improvements, advertising, and a retail merchant cooperative buying and trade credit program for their purchases of goods through the new wholesale facilities in Recife called CARE.

2. For small superettes and neighborhood stores (the largest 100), the development of a voluntary or cooperative chain which would permit group wholesale purchasing and some direct vertical coordination back to producers or rural assemblers.

3. Provide improved facilities at the urban assembly wholesale market, CARE, to permit more economical space utilization, including a credit and banking program to permit the smaller retailers to buy on credit and to receive some technical assistance.

Reform Program Three: An Urban-Rural Reform Package - In combination with the total urban retail reform package described above, a rural reform program augments those centered in the urban sector. The rural reform package concentrates on the major rice and bean producing areas in the four-state foodshed of Recife. The program is:

1. A seed multiplication, distribution and improvement program to include research on seed varieties.

2. A program to increase the use of fertilizer in the selected areas of rice and bean production. The programs would include fertilizer response research, demonstration plots, subsidies for the farm input producers and a change in tax laws to exempt fertilizers from the current circulation tax.

3. The expansion of the current price stabilization program for basic food crops and increased feasibility planning of storage requirements.

4. An input credit program which would extend lines of credit to farmers and develop a revolving semi-supervised credit plan.

5. The planning and development of market information programs.

6. An increased stress on the distribution of urban-produced consumer goods to the rural area.

7. In conjunction with the urban reform package, the needed planning and working capital that appears to be necessary to implement more vertical coordination in the purchase of locally produced food items would be provided.

The Evaluation of Resource Needs

The estimates of the investment resources necessary for the implementation of the three reform programs should not be viewed as exact, but only as values which seem reasonable without detailed feasibility and cost studies. They are presented as an example of the types of consideration which must be given in determining resource needs and in evaluating reform results.

Reform Program One: Modern Discount Supermarkets - It is estimated that this reform would require approximately US$3.6 million[1] of planning and technical assistance, construction and equipment, and working capital for implementation. Planning and technical assistance is estimated to require at least two man-years of effort (including consultants with specialties in warehousing, handling of perishables, merchandising, and general management). For construction and equipment, each store is estimated to require about $150,000, or $1.5 million for ten stores. In order to have at least one month's inventory "on hand" and assuming average weekly sales of $50,000 per store, the total working capital needs amount to about $2 million. A portion of the required investment can be generated by the supermarket operators themselves. One of the simulation results is the incremental changes in the level of undistributed profits generated by the modern retailers. This will give an estimate of the level of outside public funds necessary to implement the reform. It is appropriate to mention that the presently reported plans of current supermarket operators are such that some expansion based upon their own investments can be anticipated. This investment and expansion of supermarkets is anticipated in the "base simulation" presented later. The "base simulation" is a representation of the market system over the next five years, assuming the suggested market development schemes are not carried forward.

Table 13.1 Estimated Investment Funds Necessary for Reform Program One

	millions of dollars
Planning and Technical Assistance	.1
Construction and Equipment	1.5
Working Capital	2.0
TOTAL	3.6

[1] All figures given in this chapter are in U.S. dollars.

These funds are assumed to be allocated as follows over the first three years of the simulation: first year, $1.1; second, $2.0; and third, $.5 million.

Reform Program Two: Total Urban Retail Reform Package - The three programs for the traditional retailers in the urban area are estimated to cost $3.1 million, with the major portion coming from public funds and technical assistance provided from foreign funds. Requirements of each program are:

1. The street and public market reform program is estimated to cost $1 million. Technical assistance and planning is estimated to be $150,000 consisting of two man-years of consultant time and the hiring and training of at least 10 local technicians. Construction and equipment expenses for renewing tables and signs would require about $100,000. The largest funding requirement is for a working capital revolving fund providing an average of $300 per stall for 2,500 stalls, or a total fund of approximately $750,000. The loan agency for these funds would be located at the CARE wholesale center.

2. The organization and operation of a voluntary or cooperative chain for superettes and neighborhood stores is estimated to cost $2.1 million. Some of these funds can be generated internally, but most will come from public funds for working capital. Again, an estimated two man-years of technical assistance would be required, including experts in retail cooperative warehousing and wholesaling, managerial assistance, and local training of technicians. Construction and equipment expenses would be borne by the CARE facilities for warehousing, handling equipment, etc. This is estimated to be about a $500,000 expense. Working capital, estimated to be $1.5 million, is the largest expense. One million dollars of that would be provided by CARE, and it is expected that $.5 million could be generated internally. The estimate is based on $1,500 per store for 100 stores.

Table 13.2 Estimated Investment Funds Necessary for Total Urban Reform

	Traditional Retailers	Modern Discount Supermarkets	Total Urban Retail Package
	(in millions of dollars)		
Planning and Technical Assistance	.25	.1	.35
Construction and Equipment	.6	1.5	2.10
Working Capital	2.25	2.0	4.25
TOTAL	3.1	3.6	6.7

These funds for the traditional operators are assumed to be allocated over the first four years of the simulation in the following volumes: the first through the fourth year, $1.0, $1.75, $.25 and $.1 million, respectively. When combined with the investment necessary for the modern discount operations, the timing of the investment funds commitment for the total urban retail package is $2.1, $3.75, $.75 and $.1 million over the first four years of the simulation.

Reform Program Three: The Urban-Rural Reform Package - The largest scale reform program builds on the first two with the addition of the rural-oriented program to achieve a better coordinated food production-distribution system. This combined rural-urban reform program is estimated to cost $13 million. Of that amount, $6.7 million is committed to the urban reforms, leaving $6.3 million as the amount of estimated investment funds required for the rural portion of the reform program.

1. For the seed improvement program, an estimated $2.04 million is needed for both the bean and rice areas. Planning and technical assistance consists of two man-years of in-the-field consulting and five man-years for a Brazilian technician in each producing area. The total estimated planning and technical assistance cost would be approximately $440,000. Minor equipment needs are estimated to be $100,000. Working capital needs are estimated to be $1.1 million for beans and $.4 million for rice. These funds are necessary for the distribution and application costs for improved seed.

2. The fertilizer program is estimated to cost $.7 million for beans and $.58 million for rice for a total of $1.28 million. The major expense in this program is for subsidy funds for the production and distribution of fertilizer. These were estimated to be about $.6 million. Construction and equipment costs were estimated at $180,000 for both the rice and bean areas together. Planning and technical assistance expenses amount to the other major expense. The $500,000 allocated for these costs is split equally between the bean and rice areas and is allocated primarily to technical services, demonstration plots and experimentation.

3. The credit expansion program involves the establishment of a revolving fund costing, over the five year simulation period, $2.5 million, with $1.5 million allocated to the bean area and $1.0 million to the rice area.

4. The marketing information services are relatively low cost, with an estimated total expenditure of $480,000 over the simulation period. The cost in-

cludes three model transmitting and receiver units and personnel to operate them in each of the two producing areas.

Table 13.3 Estimated Investment Funds Necessary for Total Urban-Rural Reform Programs

	Modern Discount Supermarkets	Traditional Urban Retail Programs	Rural Bean-Rice Reforms	Total Urban-Rural Package
		(in millions of dollars)		
Planning and Technical Assistance	.1	.25	1.12	1.47
Construction and Equipment	1.5	.6	.58	2.68
Working Capital	2.0	2.25	4.6	8.85
TOTAL	3.6	3.1	6.3	13.00

The timing of the commitment of the funds for the rural program is concentrated more in the middle years of the simulation due to the need in early years for research and demonstration, with the bulk of the working capital needs starting in the second and third years. The total rural reform cost is allocated over the five years as follows: $.75, $1.5, $2.0, $1.5, and $.55 million. Combining this with the total urban reform program, the amount and timing of investment funds for the total reform program are: $2.85, $5.25, $2.75, $1.6, and $.55 million, respectively, over the five years of the simulation run.

Determination of Base Parameters

In order to have a base for comparison, a "base run simulation" is done on which all comparisons of the changes caused by the reform programs are analyzed within the five-year planning horizon. The explicit determination of the data inputs is developed from a combination of survey results, census data, and "best estimates" of the particular research team members most capable of making a judgment. The explicit listing of the values and sources of parameter inputs is reported in Appendix B. Once the base period data are determined, estimates are made on how the system might be expected to change without the implementation of the suggested reform programs. Again, the explicit value of the parameters and the rates at which they are

expected to change over time are given in Appendix B. The following parameter changes are made over the five year base simulation run:

1. Changes in Total Income - Total urban consumer income is assumed to grow at 6% per year over the simulation run. That average increase is composed of 4.5% increase in population and 1.5% increase in per capita income. It is assumed that the 6% increase applies to all consumer types. It is assumed that higher income consumers will probably have a higher per capita increase than 1.5%, but a lower population growth rate. On the other hand, it is assumed that lower income consumers will probably have slightly less than a 1.5% increase in per capita income but a higher population growth rate. In the rural sector, rural town income is expected to increase at 4% and farm income at 3.5% per year.

2. Average Propensity to Shop for Food and Consumer Goods - Without the implementation of the reform programs in the urban area, some shifting in consumer shopping behavior to modern outlets is expected to take place naturally. As consumers become increasingly aware of the price, quality, and selection advantages of supermarkets, more consumers are likely to use their facilities as those facilities become available. However, the switch to supermarkets will probably be concentrated in the middle and upper income groups and not in the lower income groups. Over the five year period of the simulation, very high, high and middle income consumers are assumed to increase food and consumer goods purchases in modern food outlets by 40%, or an average of 10% per year. Thus, at the end of five years, very high income consumers would be expected to make 42% of food expenditures in modern outlets, while the high and middle income groups are expected to purchase 31% and 21%, respectively, in modern food outlets. Consumer goods expenditures in modern outlets, as a proportion of total consumer goods expenditures in the fifth year of the simulation, are assumed to reach 4.2%, 4.8% and 5.8%, respectively, for the very high, high and middle income groups. All other shopping propensities are assumed to remain constant.

3. Other Parameter Changes - Other base run parameter changes included an average growth rate of industrial output of 5% and an increase in total farm output of about 4% per year in the four major product categories. Increases in exogenously given minimal subsistence wages, net tax revenues flowing into the area from the federal government, and the level of investment in the urban area are shown in Table 13.4.

Determination of the Parameter Value Changes for the Reform Options

Modern Discount Supermarket Reform - For this limited reform option, shopping propensities, price indices, margins, spoilage rates, location of retailer purchases, and the level of exogenous

Table 13.4 Other Estimated Parameter Changes in the Base Simulation

Time Period	Minimal Subsistence	Net Inflow of Taxes	Level of Investment
	(in millions of dollars)		
1	65	50	55
2	70	55	58
3	75	60	61
4	80	65	64
5	85	70	67

SOURCE: Simulation Run-Base

investment are considered the important points of entry into the model. All the parameter changes assumed in the base simulation are repeated except the level of investment and the shopping propensities which are further altered in this reform. For a detailed listing of parameter estimates for the supermarket reform simulation see Appendix B.

1. Average Propensity to Shop - Concentration on the modern operators at the expense of the traditional operators means that the traditional operators will become even less competitive. As availability of supermarkets offering low prices increases and the lower income consumer is attracted to these outlets which seem more directly oriented to her needs, the shift in shopping behavior will be significant. Thus, it is assumed that for the very high and high income consumer, expenditures in modern outlets for food and consumer goods will double to 60% and 50% of their respective total food budgets. It is expected that the percentage of the total food budget extended through modern outlets by middle income consumers will increase even more sharply from 15% to 40%. With this reform, the low and very low income consumers will begin shopping in these outlets, though not to the degree of the middle and upper income groups. It is assumed that the low income consumer will increase the percentage of his food budget extended in modern outlets from 10% to 30% on the average, and that the very low income consumer, who in the base year spent no money in modern outlets, will be spending an average of 20% of his food budget in modern outlets in the fifth year.

2. The Relative Price Index - This index compares the price level of food and consumer goods between the traditional and modern outlets. It is assumed that competition among the modern outlets would force their price (already 8% lower than the traditional

outlets) down slightly more over the five year period (1% over the total five years). The prices in the traditional outlets would fall some (2% assumed) but not enough to become competitive because of the financial and technical factors limiting improvements by traditional operators.

3. Spoilage and Margin Changes - Spoilage and margin are altered in the modern outlets for food. Margin is dropped from 20% to 19% gradually over the five year period due to increased vertical coordination. Spoilage, however, is assumed to increase from 1% to 2.5% in the modern outlets as they broaden their product mix to include more non-processed and perishable food items.

4. Retailer Supply Purchases - The origin and type of retailer supply purchases are also expected to change only for modern outlets. There is an assumed increase from 20% to 31% in the amount of non-processed food purchased from the rural sector as a proportion of the total food purchases by modern outlets. This develops as non-processed food becomes relatively more important in their product mix and as vertical coordination efforts are continued.

5. Investment - The level of exogenous input of investment funds is augmented according to the previously developed investment cost schedule for this reform option. For the first three years, there was an added investment flow of $1.1, $2.0 and $.5 million, respectively.

The Total Urban Reform Program - The same entry points are considered for the total urban reform package as for the more limited modern discount supermarket reform. The values of the parameter changes are different, however (see Appendix B for a complete listing of parameter estimates under the total urban reform simulation).

1. Shopping Propensities - The change in shopping propensities is somewhat less than that suggested in the modern discount supermarket reform but still more than in the base simulation; because this total urban package contains programs for the traditional operators, they can be expected to react more constructively to the modern discount supermarkets. For the total urban reform package, it was assumed that during the five years: very high income consumers would increase the percentage of their food budget spent in modern outlets from 30% to 50%; high and middle income groups would increase from 20% to 41% and 31%, respectively; low income consumers would double their purchases from 10% to 20%; and very low income consumers would go from no purchases in modern outlets to 12% of their total food purchases.

2. The Relative Price Index - It is assumed that the increased buying power and competitive viability of the

traditional outlets permits them to reduce the average relative food prices by 5% over the five year period. Further reaction in the modern outlets is assumed, lowering prices another 2%.

3. Spoilage Rates - The rate of spoilage in both the modern and traditional outlets is changed as a result of the reform package. In the modern outlets the change is similar to that in the first reform, i.e., a slight increase of 1% over the five year period due to the increase in sales of perishable items. In the traditional outlets, however, there was a significant drop in the rate of spoilage or loss in food items. For street and public markets, the spoilage (mostly perishable foods) cut in half over the five year period from 20% down to 10%. For the neighborhood stores, the rate of spoilage is decreased from 10% to 6%. All other spoilage rates are held constant.

4. Margin - The margin is again changed only for the modern channel outlets by slightly less than 2% over the five year period. The margin in the traditional outlets is not changed because it is assumed that the lowered spoilage and the relative decrease in buying costs over selling costs allowed the traditional retailer to keep the same gross margin. With the lower spoilage countered by the lower selling price, the net profit to traditional retailers is not expected to change significantly.

5. Purchase Location - The location of retailer purchases and the proportion of processed food vs non-processed food purchases are also changed in the total urban reform package. Added to the 10% shift assumed in the modern outlets from processed food to non-processed food purchased in the rural area, it is assumed that the emphasis on processed foods as a proportion of total sales in the neighborhood stores will also shift in favor of the locally produced non-processed foods by about 5% over the five year period.

   This shifting of demand away from processed food does not mean that the demand for processed foods falls; it in fact still rises. But, as the modern and traditional neighborhood stores grow and take on a more rounded mix of products, they will be buying a larger relative proportion of non-processed and perishable foods. Currently, both types of outlets are heavily concentrated in canned and other types of processed foods.

6. Investment - Over the first four years of the simulation run, current expected investment is increased by $2.1, $3.75, $.75, and $.1 million, respectively.

The Urban-Rural Reform Program - Added to the total urban reform program is a major production and distribution reform package for beans and rice in the rural sector. All parameter changes estimated for the total urban program are retained in this reform pack-

age, and additional parameter changes in the rural sector are incorporated.

The implementation of the rural reform package brings into use the special modern and traditional production types defined in the rural sector. These permit a delineated study of from one to five commodities. The entry points considered in this reform option are the rates of yield and land use for total bean and rice output in the four-state area, gross margins of assemblers, processors, and transporters in the rural area for food, and the exogenous input of investment funds into the rural sector. For a detailed listing of parameter changes, see Appendix B.

1. Yield - The yields of the traditional farmers are assumed to remain constant at .6 tons per hectare for beans and 1.7 tons per hectare for rice. For the modernized farmers, yields are assumed to increase 40% in the second year, 20% in the third, 20% in the fourth, and 10% in the fifth year. By the end of the fifth year, potential yields on the modernized land are expected to be 1.14 tons per hectare for beans and 3.2 tons per hectare for rice. These estimates are based on the expected returns from research, fertilizer use, and improved seeds.

2. Land Use - The degree to which the modern yield rates are realized is determined by the amount of land which is put to use under the modernized conditions. The area to which the reform is applicable accounts for about 464,000 hectares, or 24% of bean plantings in the four-state area and about 73,000 hectares, or 42% of rice plantings in the four states being considered. Within the reform areas, the switch rate from traditional to modern farming is assumed to be 2% of the total producer population in the second year, 8% in the third, 20% in the fourth, and 20% in the last year. Thus, by the fifth year, 50% of the land in the pertinent reform areas is assumed to be converted to modern production. This, then, means that of the total area producing beans and rice, 12% conversion in beans and 21% conversion in rice is assumed.

3. Margin Decreases - With the improvement in market information and urban vertical coordination in selected areas, the over-all gross margin generated in the rural area for food is assumed to fall 2% over the five-year period. Though the gross effect is small, in the areas and products affected, gross rural margin drops by one-third (10%) but it only represents about 20% of the total food production in the rural sector (2% is 20% of 10%).

4. Investment Increases - As in the urban reforms, the investment funds necessary to implement the reforms are input into the rural sector as demands for labor, construction materials, equipment, and changes in the ability to buy farm inputs, i.e., an increase in

the technical coefficient relating farm input value per unit output.

5. Increases in Investment Funds - Incorporated into the rural sector are the investment funds necessary to implement the rural reform program. Over the five-year period, the investments generated by the rural reform program are: $.75, $1.5, $2.0, $1.5, and $.55 million, respectively. Thus, for the total urban-rural program, investment funds will be increased in the system (both urban and rural) by $13 million split over the five years of the simulation as follows: $2.85, $5.25, $2.75, $1.6, and $.55 million, respectively.

Evaluation of Simulation Results

The simulations were run on the CDC 3600 computer at Michigan State University. Each simulation of five time periods took approximately two minutes of computer time and generated 310 pages of detailed economic information about each sector and a condensed set of performance measures for the system in general. In the actual use of the simulations and their evaluations, the development planner would want to carefully examine not only the values of the performance measures but also the more detailed results before making a decision on the economic feasibility and desirability of any of the reforms. The evaluation of the impact of the reforms contained herein is presented illustratively and thus should not be continued as a complete analysis for development planning.

Since each simulation assumes a five year planning horizon, it is expected that the results will be conservative, since most of the investment costs are incurred in the first three years, but the costs and benefits arising within the economic system will continue to be generated after the first five years. The assumption of an open system relative to consumer income generation also tends to underestimate results because certain multiplier effects are not automatically taken into consideration (see page 13-15 of this chapter). Assuming the open system, i.e., consumer income is given exogenously to each consumer type each year, was necessary in order to avoid potentially large misleading results in income multiplier effects. Parameter estimates for the crucial link between major sources of income generation (about 80% of all consumer income) and the individual consumer types receiving that income were not available at the time these illustrative simulations were run. Careful checks were made, however, in a *post hoc* manner, to verify the consistency between total consumer income generated and expended. A variance of 1% or less was achieved in all simulations.

The results of the simulations demonstrate the importance of comparative analysis between various options and a base simulation representing the expectation of how the system would operate without these specific reforms. The base simulation projects the present system for five years, including development changes expected to take place independent of the reform programs analyzed here (such as industrial expansion through 34/18 investment).

The simulations will suggest the nature of the consequences of implementing these reform options and show the type of analysis which can be expected from the Recife Systems Model. The results of each successively more inclusive reform program are presented separately, and then summarized with the calculation of one potential measure of social return on investment relating investment costs to additions in consumer buying power generated by the reforms.

Modern Discount Supermarket Reform Program - With the implementation of this reform program of ten additional modern discount operations, the annual sales of food in modern outlets rises from $14.9 million in the first year to $52 million in the fifth year of the simulation (Table 13.5). By the fifth year, this represents an increase over that expected without the reform of more than 100% ($23.8 million vs $52 million). At the same time, the annual sales in the traditional outlets fell absolutely. Street and public market sales decreased from $51.2 million to $46.1 million and the annual sales of traditional neighborhood stores dropped to $40.9 million from $45.5 million. This annual sales decline does not present the entire picture, however. The sales decline in traditional outlets is even more significant when compared to the sales which the traditional operators could have expected in five years if no reform had been implemented. Expected annual sales in the fifth year for the base simulation were $62.2 million for the street and public markets compared to $46.1 million under the supermarket reform simulation. Similarly, neighborhood store sales amounted to $55.1 million in the fifth year for the base simulation compared to $40.9 million under the supermarket reform simulation. The modern operator share of the market rose from 12.3% to 34.3% with this reform compared to the no reform situation, where their market share rose only to 15.5%.

Table 13.6 shows that total annual wages and distributed profits generated in the distribution sector increased over the five year period from $30 million to $36.2 million, but that increase is

Table 13.5 Annual Sales in Selected Distribution Sector Channel, by Outlet Types

(in millions of dollars)

	Time Period				
Sales in Supermarkets	1	2	3	4	5
Base Simulation	14.9	16.8	18.9	21.2	23.8
Supermarket Reform	14.9	22.4	31.3	41.1	52.
Street & Public Markets	1	2	3	4	5
Base Simulation	51.2	53.7	56.4	59.2	62.2
Supermarket Reform	51.2	50.4	49.3	47.8	46.1
Traditional Neighborhood Stores	1	2	3	4	5
Base Simulation	45.5	47.6	50.	52.5	55.1
Supermarket Reform	45.5	44.7	43.7	42.4	40.9

SOURCE: Simulation Run "Base" and "Mods Only-III"

$1.6 million less than expected with no reform. The traditional operators in the sector fared much worse than the average, however. Annual wages and income generated dropped absolutely in both traditional types, and when compared to expectations without the reform, the decrease in wage and income generated is $4 million in the fifth year. Modern outlets took up $2.4 million of the expected loss to traditional retailers. The wages and distributed profits generated in the distribution sector, while absolutely higher by $6.2 million over the current year, are a total of $3.7 million lower than would be expected with no reform over the entire five years. Thus, relative to expectations and in absolute terms, the traditional operators have been dealt a severe blow because they could not or would not react competitively. It should be remembered that it is the shifting consumer preferences to more modern, lower priced and more convenient retail outlets which provides the driving force behind these expected changes.

Total wage income and distributed profits from all sectors increased over the five year period, but are still $1.9 million below that which could have been expected without the reform. The negative effect in the distribution sector is more than offset by the "construction effect" of the added investment funds

input into the system in the first three years, but by the fourth and fifth years the money income begins to fall below base simulation expectations.

Table 13.6 Direct Wages and Distributed Profits Generated in the Distribution Sector for Food Sales

(in millions of dollars)

Wages and Distributed Profits Generated In:	Time Period				
Total Sector	1	2	3	4	5
Base Simulation	30	31.7	33.6	35.6	37.8
Supermarket Reform	30	31.4	32.9	34.5	36.2
Supermarkets	**1**	**2**	**3**	**4**	**5**
Base Simulation	1.9	2.1	2.3	2.6	2.9
Supermarket Reform	1.9	2.6	2.4	4.3	5.3
Streets & Public Markets	**1**	**2**	**3**	**4**	**5**
Base Simulation	8.8	9.3	9.7	10.2	10.7
Supermarket Reform	8.8	8.8	8.7	8.6	8.4
Traditional Neighborhood Stores	**1**	**2**	**3**	**4**	**5**
Base Simulation	6.6	6.9	7.3	7.7	8.
Supermarket Reform	6.6	6.6	6.5	6.4	6.3

SOURCE: Simulation Runs "Base," "Mods Only-III"

These negative income effects are completely offset relative to the base simulation when the incremental consumer real income generated to final consumers from their shifting buying behavior to lower priced outlets is considered. Thus, given a level of money income, consumer "buying power" is increased. Over the five years, more than $5 million of incremental real income is created for consumers. Table 13.7 summarizes the timing of this incremental real income generated from lower relative food prices. Thus, while traditional retailers in the distribution system lose relative wages, the consumers in the aggregate improve their net "buying power" over the base simulation where no reform is assumed by $2.9 million.

Table 13.7 Incremental Consumer Real Income Generated from Lower Prices and Changing Buying Behavior

(in millions of dollars)

Simulation	Time Period 1	2	3	4	5	Total
1. Base Simulation	0	.09	.1	.1	.11	.4
2. Modern Discount Supermkt. Reform	0	1.23	1.27	1.32	1.38	5.2
3. Net Additions to Real Consumer Income (2-1)	0	1.14	1.17	1.22	1.27	4.8
4. Changes in Buying Power (All Sources)	0	1.1	.9	.7	.2	2.9

SOURCE: Simulation Runs "Base" and "Mods Only-III"

With the modern discount supermarket reform, imports rise by $2.2 million over what would have been expected without the reform, to a level of $49.2 million in the fifth year (see Table 13.15 later in this chapter). This is caused by the consumer shift to the modern outlets which depend much more on importation than the traditional operators. While the modern operators do shift in some degree to more local purchasing, it is not sufficient to offset the magnitude of imports given the great increase in their sales.

Internally generated undistributed profits and depreciation (potential investment funds) increase over the base simulation by $1.2 million over the five years. These arise primarily from the modern retailers and can be expected to pay for at least a part of the total investment commitment necessary for the implementation of the reform.

While incremental real income is increased to the urban consumer, this reform option does not look very attractive when compared to the costs in expected wages, increases in importation and the dislocation caused among the traditional retailers in the distribution system.

The Total Urban Reform Program - The reform program which concentrates only on modern supermarkets produces significant negative effects which the simulation clearly shows. With the

implementation of the total urban reform program the results are very different within the urban sector.

Table 13.8 shows annual sales of modern outlets still rising significantly above base simulation expectations without a reform program by almost $13 million in the fifth year. This is, however, a much smaller increase than with the modern discount reform alone, $36.5 million vs $52 million. Thus, while annual sales in the modern operations more than double over the five year period from $14.9 million to $36.5 million, the increase is not so great that the traditional operators record an absolute loss in annual sales.

Table 13.8 Annual Sales in Selected Distribution Sector Channel-Outlet Types

(in millions of dollars)

	Time Period				
Sales in Supermarkets	1	2	3	4	5
Base Simulation	14.9	16.8	18.9	21.2	23.8
Supermarket Reform	14.9	22.4	31.3	41.1	52.0
Total Urban Reform Package	14.9	19.8	25.4	31.6	36.5
Streets & Public Markets	**1**	**2**	**3**	**4**	**5**
Base Simulation	51.2	53.7	56.4	59.2	62.2
Supermarket Reform	51.2	50.4	49.3	47.8	46.1
Total Urban Reform Package	51.2	51.7	52.1	52.4	52.7
Traditional Neighborhood Stores	**1**	**2**	**3**	**4**	**5**
Base Simulation	45.5	47.6	50.0	52.5	55.1
Supermarket Reform	45.5	44.7	43.7	42.4	40.9
Total Urban Reform Package	45.5	45.8	46.2	46.5	46.7

SOURCE: Simulation Runs "Base," "Mods Only-III," "Total Urban-III"

Obviously, their sales are below those expected without the reform, but by the end of the fifth year, their annual sales have risen absolutely by over $2.7 million. The ability of the traditional operators to react to competitive conditions has increased sufficiently

with the implementation of reforms oriented toward improving their operations. As a result of the total urban reform package, they are able to at least "hold their own" in terms of total annual sales.

As seen in Table 13.9, the level of wages and income generated annually by the distribution sector with this more inclusive reform program also shows a different picture than the modern discount supermarket reform. Total annual wages and distributed profits generated in the distribution sector from all outlet types are only

Table 13.9 Direct Wages & Distributed Profits Generated in the Distribution Sector for Food Sales

(in millions of dollars)

Wages and Distributed Profits Generated In:	Time Period				
Total Sector	1	2	3	4	5
Base Simulation	30.0	31.7	33.6	35.6	37.8
Supermarket Reform	30.0	31.4	32.9	34.5	36.2
Total Urban Reform Package	30.0	31.7	33.5	35.4	37.5
Supermarkets	1	2	3	4	5
Base Simulation	1.9	2.1	2.3	2.6	2.9
Supermarket Reform	1.9	2.6	3.4	4.3	5.3
Total Urban Reform Package	1.9	2.3	2.9	3.4	4.
Streets & Public Markets	1	2	3	4	5
Base Simulation	8.8	9.3	9.7	10.2	10.7
Supermarket Reform	8.8	8.8	8.7	8.6	8.4
Total Urban Reform Package	8.8	9.1	9.4	9.7	10.
Traditional Neighborhood Stores	1	2	3	4	5
Base Simulation	6.6	6.9	7.3	7.7	8.
Supermarket Reform	6.6	6.6	6.5	6.4	6.3
Total Urban Reform Package	6.6	6.7	6.9	7.	7.1

SOURCE: Simulation Runs "Base," "Mods Only-III," "Total Urban-III"

$300,000 below the expected wages under no reforms. This is in sharp contrast to the $1.6 million difference in annual wages under the modern discount supermarket reform. Also, in the aggregate, total wages and distributed profits for all five years are only $.6 million below base simulation expectations vs $3.7 million below in the modern discount retail reform. This gain in income arises largely from the traditional retailers as their competitive ability increases. Income generated by the modern outlets, while more than doubling over the five years, is $1.3 million below that generated by the modern discount reform alone. In contrast, the traditional operators have absolute increases in income at about the same level as the modern outlets because of their increased ability to react to competition and hold sales that would have been lost. Wages rise from $6.6 million to $7.1 million and again are less than one million below that expected if no reform program was implemented.

Clearly, the more inclusive reform program that aids the traditional operator produces beneficial results to the modern operators though not to the degree that they might like and it does not create unemployment or reduce sales of the traditional operators. Now it is important to compare this benefit with the changes in incremental consumer real income from lower relative food prices generated to all final consumers.

For the final consumer, the more inclusive reform program produces even more positive results. Incremental consumer real income generated from lower prices totals $7.8 million over the five years, compared to almost nothing if no reform is implemented and compared to $5.2 million for the modern discount retail reform along, as Table 13.10 demonstrates.

The increase in real consumer income derives directly from the increased ability of the traditional retailers to react to the competition of the modern outlets. The consumer not only benefits from lower food prices because he shifted to modern outlets, but also because the food price within the traditional outlets is lowered.

Until the fifth year of the simulation, total annual consumer income is above base simulation expectations. But by the last year the income produced by the reform's "construction effect" are declining and total annual consumer income falls below the base simulation value. For the entire five year period, however, total wages and distributed profits still remain significantly higher than in the base simulation assuming no reform. An additional $1.5 million

in money income over base simulation consumer income from all sectors results from this reform program. This is $3.4 million more than income expectations for the modern discount retail reform alone. Consumer buying power over the five years increases by $8.9 million (the sum of increases above the base simulation in wages and distributed profits, $1.5 million, and incremental consumer real income from lower prices and shifting shopping behavior, $7.4 million) (Table 13.10).

Table 13.10 Incremental Consumer Real Income Generated From Lower Prices and Shifting Buying Behavior

(in millions of dollars)

Simulation	Time Period 1	2	3	4	5	Total
1. Base Simulation	0	.09	.1	.1	.11	.4
2. Modern Supermarket Reform	0	1.23	1.27	1.32	1.38	5.2
3. Total Urban Reform Package	0	1.87	1.92	1.97	2.04	7.8
4. Net Additions to Real Consumer Income	0	1.78	1.82	1.87	1.93	7.4
5. Changes in Buying Power	0	2.4	2.3	2.4	1.8	8.9

SOURCE: Simulation Runs "Base," "Mods Only-III," "Total Urban-III"

In the analysis of incremental consumer real income effects, the influence on income distribution is important. Tables 13.11 and 13.12 show that 93% of the real income generated by the total urban program went to the middle and lower income groups, with 50% going to the low income groups. The tables show that the impact on total consumer income is much greater for the lower income groups than for the higher groups.

The level of undistributed profits falls by slightly more than $.5 million relative to the modern discount retail reform program because the modern operators have a smaller sales increase and the traditional retailers generally use all of their profits as income, i.e., all profits are distributed. Thus, the modern

retailers cannot be expected to finance as many of the reform costs as they might in the modern discount retail program alone.

Table 13.11 The Percentage Each Income Class Receives of the Incremental Consumer Real Income Generated

	Consumer Income Class				
	Very High	High	Middle	Low	Very Low
Supermarket Reform	5	6	45	35	9
Total Urban Reform Package	3	4	44	37	12

SOURCE: Simulation Runs "Mod Only-III" and "Total Urban-III"

Table 13.12 Each Consumer Type's Incremental Real Income as a Percent of Their Total Real Income

	Consumer Income Class				
	Very High	High	Middle	Low	Very Low
Supermarket Reform	.1	.2	.4	.5	.8
Total Urban Reform Package	.1	.2	.6	.9	1.4

SOURCE: Simulation Runs "Mod Only-III" and "Total Urban-III"

Another positive feature of the total urban reform program is that imports, while rising over the five year period, fell relative to what would have been expected if no reform program had been attempted. Over the entire five year period, the decrease in imports relative to the base simulation was $2.7 million.

The choice between the two reform programs is not difficult to make. The total urban program generates more consumer buying power and money income, lowers imports, and does not cause major employment problems for the traditional retailers in the distribution system.

The Total Urban-Rural Reform Program - The total urban retail program has been demonstrated to have significant positive effects on the urban sectors, but little or no effects on the rural sector except for some increases in vertical coordination. The implementa-

tion of the total urban programs in combination with the rural reform program designed to stimulate farm production by stabilizing markets and improving the distribution of key farm inputs among rice and bean farmers produces some interesting results.

For the rural reform, the sum of rural output for the five years is $11.6 million more than the base simulation expectations. This increase arises only from bean and rice production and is steadily increasing over the five years of the simulation (Table 13.13). The level of farm inputs of seeds, fertilizer and equipment grows and generates increased demand for those products. This demand can be partially supplied by the urban area of Recife.

Table 13.13 Rural Food Output

(in millions of dollars)

	Time Period					
	1	2	3	4	5	Total
Base Run Simulation	256.3	268.9	282.2	296.2	310.7	
Rural Reform Package	256.3	269.	283.1	299.4	318.1	
Difference in Output	0	.1	.9	3.2	7.4	11.6

SOURCE: Simulation Runs "Base" and "Urban-Rural II"

Added income generated in the rural sector from rice and bean producers and distributors amounts to $8.5 million over the five year period, as shown in Table 13.14. Increases in productivity accounted for 60% of that increase, with the remainder being generated by the influx of investment funds from the implementation of the reform program which generated a "construction effect" in the rural area, thus increasing the demand for labor, materials, and equipment.

In the urban area, the combination of the urban and rural reform programs increases the returns to the consumer when compared to the urban reform program alone. When the two programs are combined, wage and non-wage income generated in the urban sector over the five year period increased by $4.5 million, or $3 million above the increases in income generated by the urban reform program alone. Thus, total consumer buying power in the urban

area is almost $12 million over base simulation expectations. This can be directly traced to the added impact of the investment funds on wages and the increase in output of the farm inputs industry in Recife in response to the added demand placed on it by the rural sector. Smaller increases are also present in consumer goods and processed foods production as the rural demand for these items is expanded due to higher farm income.

Table 13.14 The Total Increase in Consumer Buying Power Generated to Both the Urban and Rural Sectors by the Implementation of Each Reform Program[a]

(in millions of dollars)

Reform Program	Time Period 1	2	3	4	5	Total
Supermarket Reform	0	1.1	.9	.7	.2	2.9
Total Urban Reform Package	0	2.4	2.3	2.4	1.8	8.9
Rural Reform Package	3	.5	1.8	3.5	2.4	8.5
Total Urban & Rural Reform Packages	.3	3.2	4.7	6.8	5.3	20.3
In Urban Area	0	2.7	2.9	3.3	2.9	11.8
In Rural Area	0	.5	1.8	3.5	2.4	8.5

[a]The total increase in buying power consists of: incremental increases in real income from lower prices and shifting buying habits and increases (decreases) in wage, non-wage, and distributed business profits generated to the final consumer from the sectors in the economy. All figures are relative increases in buying power over the base simulation, which assumes none of these reform programs.

SOURCE: Simulations "Base," "Mods Only-III," "Total Urban-III," and "Urban-Rural-II"

In the total urban and rural reform simulation, the level of annual imports by the urban distribution sector drops even lower than with the urban reform program alone (Table 13.15). The effect of implementing both rural and urban reforms is to reduce annual imports by $2.3 million over the five years, compared to the urban reform alone, and by $5 million over the base simulation expectations with no reform being implemented.

Table 13.15 Value of Imports of Food and Consumer Goods into the Urban Distribution Sector

(in millions of dollars)

	Time Period				
	1	2	3	4	5
Base Simulation Run	36.4	38.8	41.2	43.9	47.
Supermarkets	36.4	39.4	42.5	45.7	49.2
Total Urban Reform Package	36.4	38.5	40.8	43.2	45.7
Total Urban Reform Package and the Rural Reform Package	36.4	38.3	40.2	42.6	44.8

SOURCE: Simulation Runs: "Base," "Mods Only-III," "Urban Total-III," and "Urban-Rural-II"

The Impact of the Exogenous Investment Funds - The effect on wage and non-wage income in the urban and rural areas caused by the "construction effect" of investing $13 million in reform programs has been outlined. This investment causes an increase in wages in the first years of the reform but by the fourth and fifth years the effect tapers off. In so doing, the investments are able to offset lower wages generated in other areas in the early years or augment income increases in other sectors.

Besides adding income, these investment funds created demand for construction materials and capital equipment. Due to the continued lack of supply in the Recife area, a significant portion of the demand is funneled to the South/import sector. Thus, some of the potential benefits of the reform options within the region are lost.

A Summary Comparison of the Three Reform Programs

The importance of building a balanced reform program is very apparent with the careful analysis of these results. Successively more inclusive programs produced greater economic benefits in the form of increased wage and non-wage income, higher consumer buying power, and reduced imports. Further, there seemed to be less negative effects caused by modernization when the traditional retailers were given the opportunity to improve their competitive ability with the modern operators "leading the way." Table 13.14 demonstrates the compound effects which could be gained through reform programs

interrelating the urban and rural sectors. The total additions to consumer buying power generated by the rural and urban reforms, if implemented separately, sum to $17.4 million, but when combined, the total increase in real income amounts to $20.3 million over the income generated in the base simulation.

The simulation model has been able to present information which might not otherwise have been available. The fact that with the total urban retail program, which included a major program for increasing the importance of modern discount supermarkets in the urban sector, the annual wages to the traditional operators still increased over the current level is important information for the planner (see Table 13.9). The concentration of incremental real income from lower relative prices generated in the middle and lower income groups not only helps the low and middle income consumer, but by this slight redistribution of income, it frees some savings normally held by high income consumers to be spent on food and consumer goods which would further increase aggregate demand (see Table 13.12). One important negative effect of the modern discount reform when implemented alone was the increase in imports above those expected without a reform. Table 13.15 shows that only in that reform were imports higher than in the no-reform situation. Many other points could be outlined and much further information could be gained from a careful analysis of the detailed economic data generated by the simulation printouts (see Appendix B for examples of the type of economic information which the printout of the simulation generates) but the ability of the model to assess the interdependence of reform programs within a large system and at the same time analyze their impact in a sector and within types defined within a sector has been demonstrated.

One Measure of Social Return on Investment: A Buying Power Index - The economic benefits generated by these illustrative reforms must be compared to the costs of implementing those reforms. Earlier in this section it was stated that the successively more inclusive (and more costly) programs produced greater economic benefits; but, from an economic standpoint, only if the benefits are relatively greater than the increase in investment can they be justified. One means to accomplish this is to contrast the explicit investment cost over the five year period with the increase in consumer buying power generated from lower prices, shifting buying behavior, and increases in wage and non-wage income. This could be considered one of the measures of "social

return" on the investment in the reform programs.[2] The financial definition of "rate of return" can be altered here by developing that rate of return which "discounts" to zero the costs of the investment relative to returns in increased buying power, taking the timing of costs and benefits into consideration. Essentially, it determines that rate of return on investment which is generated in the form of added consumer real income to the society over what could have been expected if the reforms were not implemented.

Table 13.16 summarizes the level and time commitment of the investment funds estimated for all three reform programs. It is quite possible that, while the total urban-rural reform program

Table 13.16 Estimated Level of Investment Funds Committed for the Reform Programs

(in millions of dollars)

	Time Period					
Reform Program	1	2	3	4	5	Total
Supermarket Reform	1.1	2	.5	0	0	3.6
Total Urban Reform	2.1	3.75	.75	0.1	0	6.7
Rural Reform Package	.75	1.5	2.	1.5	.55	6.3
Total Urban & Rural Reform Packages	2.85	5.25	2.75	1.6	.55	13.00

SOURCE: Pages 13-10 to 13-14 of this chapter.

[2]Many other "social rates of return" could be considered here. Because of the general concentration on consumer benefits in this analysis of the reform programs, the "consumer buying power index" is defined as an illustration of a general system performance indicator. Perhaps the most logical other "social rate of return" which could have been presented would be a comparison over time of the investment funds committed and the total net incremental additions to "value added" in each sector in the economic system. The structure of the analysis would be identical, but undistributed business profits and changes in tax payments by business at all levels in the economy would be added to present additions in "buying power" to more accurately reflect true "value added."

is expected to produce the most benefits, the implementation costs would be high enough to result in a lower rate of return in consumer benefits than for one of the less inclusive programs. Thus, these costs must be compared with total incremental real income generated over the same time periods for the three reform programs. Table 13.14 summarized the real income benefits. By subtracting the investment costs from the income or buying power benefits, as seen in Table 13.17, the net value of benefits for each reform program is determined for the five year period.

Table 13.17 The Net Value of the Difference between the Real Income Generated and the Investment Funds Committed

(in millions of dollars)

	Time Period					
Reform Program	1	2	3	4	5	Total
Supermarket Reform	-1.1	-.9	.4	.7	.2	-.7
Total Urban Reform	-2.1	-1.35	1.55	2.3	1.8	2.2
Rural Reform Package	-.45	-1.	-.2	2.	1.85	2.2
Total Urban & Rural Reform Package	-2.55	-2.05	1.95	5.2	4.75	7.3

SOURCE: Table 13.4 minus Table 13.16

Table 13.18 summarizes the results of those computations in determining the "buying power index." As in most of the other performance measures which have been chosen in the comparative analysis of these reforms, when the added consumer buying power is compared to investment costs and the discounted rate of return computed, the more inclusive and balanced combination of the urban and the rural reform programs results in a significantly higher rate than any of the others.

The returns in total incremental real income do not stop in the fifth year; they will continue at a somewhat lower rate. This will further increase the rate of return which could be expected from the reform programs. For example, if it is assumed that the total urban and rural reform program continued to generate additions

to real income at a much lower rate of $3 million per year for another five years, the rate of return would increase to over 50%. The other reforms would show similar gains in return.

Table 13.18 Consumer Buying Power Index[a]

Urban Supermarket Reform Program	Negative Return
Total Urban Market Reform Package	22%
Rural Reform Package	27%
The Total Urban & Rural Reform Packages	40%

[a]The estimated annual rate of return on the committed investment funds relative to additions in consumer buying power (added real income over base simulation) generated by the reforms for a five year period.

Conclusions Drawn from the Simulation Analysis - The Recife Systems Model has shown itself capable of analyzing alternative reform options. The results, while presented illustratively, demonstrate that a general systems model, utilizing the technique of computer simulation, does have the ability to analyze the impact of reform programs in a way that focuses on the interaction effects between the sectors in the economy. At the same time, the model is disaggregated sufficiently to permit analysis of the effect of a reform within sectors and sub-sectors. This is vitally important to the development planner. Though not presented here, the detailed economic information which accompanies the results of all simulations further refines the knowledge of the system which the development planner can obtain (see Appendix B for some examples).

With all its assets, the model should not be used as the only device for evaluating the desirability of a reform program. The non-economic consideration must be included (though knowledge of economic consequences can often give insight into the non-economic implications of change). The intuition and experience of the planner should be brought to bear on the results of the simulation to determine their "reasonableness" relative to the economic, social and political system under analysis. Further, while a general systems model can be a powerful planning tool,

it can also be a way to "prove" a politically motivated objective. The analysis that can be undertaken by a general systems model can be extraordinarily complex and thus sometimes appear dazzling. The results, however, are no more accurate than the assumptions. The analysis results are determined by the data inputs, and assume relationships which are explicit but not necessarily accurate. Perhaps the most precarious assumptions lie in the area in which the policy variables are linked to the key economic variables in the system at the discretion of the planner (for example, the impact of credit on the rate of fertilizer utilization).

The virtue of a general systems model is the flexibility of the model to provide a basis for analysis. The objectives of the analysis must be those of the decision-makers who are attempting to utilize this research tool to evaluate the very complex interactions and consequences of individually explicit and, indeed, individually simple relationships.

The reform programs that are tested here are, in fact, based on the conclusions drawn by the MSU/SUDENE marketing research team. Other development requirements and goals (for example, health and educational goals) are not explicitly included in this design. Developmental experts more concerned with other development goals might seek to change the model variables to evaluate other approaches to programming development.

We hope that we are conveying that a systems model can be an enormously useful and powerful analytical device capable of arithmetic tasks through computer simulation that would otherwise be extraordinarily difficult. The important gain from a general systems approach to examination of a social process such as the marketing processes of Recife is in the orderliness of the approach. Major assumptions must be made explicit in the model; hence, differences in the opinions of important decision-makers can be more fully identified and evaluated. It is in this sense that we earlier referred to the general systems model as a basis for forum discussions among decision-makers.

The emphasis in this last chapter should truly be a full consideration of the factors involved in programming marketing development. We have in this central section of the chapter given great emphasis to the possible applications of the general systems model to evaluate the reforms outlined in Chapter 12. We have placed this emphasis on the model simulations not merely because it is a novel tool of analysis for assessing the benefits and costs associated with specific reforms, but because it permits a fuller

analysis of a process of change. A crucial question was raised at the outset of this series of market process investigations concerning the probable employment effects of marketing reforms. The complex and interdependent changes that occur when market processes are modified demand the kind of systematic appraisal that has been demonstrated to be practical in this series of studies. Yet, because of the complexity of the issues and the political significance of income redistribution that is occasioned by marketing reforms, an orderly forum for discussion of the consequences of differing assumptions about the relationships between reform actions and development consequences suggests the merit of a general systems approach.

The Role of Marketing Process Reform in Development

Market processes are deeply imbedded in many facets of a community's total activities. Thus, an integrated development approach appears warranted. Development efforts of the past appear to have overstressed production problems of development, sometimes at the expense of solving the various market coordination problems of the community. This seems to be correcting itself to some extent. It also appeared that a more useful conceptualization of national market development is emerging which points up the need for new social and quantitative research skills to deal with marketing reforms.

In this AID-sponsored research project, an interdisciplinary team has made some progress in both the conceptual and empirical aspects of the problem. There is a growing recognition that a systems approach utilizing computers to assist in simulating complex processes may be needed to appraise the costs and benefits of alternative development strategies.

The question of how to proceed becomes important, for there is as yet no sustaining tradition to implement national market process development. Internal national market processes seemingly need to be institutionalized. The typical formulation of government structure represents sectors of the economy--agriculture, industry, finance, etc. Yet, what seems to be needed is an integrative approach. The critical problem is how to utilize government resources to foster the appropriate private sector growth. Here a page from the experience of Puerto Rico might be helpful. During the period of rapid change in Puerto Rico's economic development, a series of agencies "fomented" change. Observations *ex post* sug-

gest a pattern which might be installed as a continuing task-oriented program; perhaps such a programmatic approach would be useful for the SUDENE organization in Northeast Brazil.

A suggested four-step program can be described as follows:

1. Identify market development needs or opportunities by sustained diagnostic research into market processes in order to identify barriers to effective market coordination, and to specify reforms that would reduce or remove these barriers. Such a research capability represents an extension of the kind of research and analytical activity carried forward by the SUDENE/MSU marketing research team this past year.

2. The costs and benefits attributable to the new or continued marketing institution reforms should be evaluated. A simulation model can be a useful tool to facilitate the decision process of government and financial development officers of SUDENE. A computer-based simulation model can be continually improved by injecting improved estimates of parameters into the model as a result of the continuing research. The model can serve as a forum for evaluation of alternative strategies for development and for the consideration of the probably consequences of various development schemes.

3. For those development projects that have been first, identified by the marketing research and second, evaluated by the research techniques, an assessment needs to be made to determine which of the programs merit investment and promotion. This executive function of identifying development programs of merit will call for a different set of skills in order to promote the participation of potentially interested investors and entrepreneurs. The set of skills needed here requires capacities for personnel evaluation and promotion that are not usually part of the make-up of the marketing researcher or the systems analyst. Creative banking officers will be needed to assist in identifying apportunities and putting forth the appropriate promotional efforts to secure entrepreneurial participation.

4. Finally, if the program is launched, technical assistance and supervised credit can be important tools to foster the development goals, to ensure that operators who have accepted guidance and financial support from the development agencies follow the desired rules of business operation. It is useful to bear in mind that some marketing institutions may need to be "retired"--and the use of development funds to "retire" inefficient institutions may be cheaper and faster than political techniques.

Thus, it is our suggestion that the SUDENE organization consider a task-oriented group approach which may cut across the present departmental lines to draw together research teams interested

in sustaining research not only in the agricultural sector, but in the industrial areas as well. A systems simulation team could be an important part of this research and evaluation group. It is also important that SUDENE cooperate closely with banking institutions to create a fomenting and promotional agency to identify and foster private sector entrepreneurial participation in high priority development programs involving marketing processes. Supervised credit can be one of the most effective techniques for injecting the appropriate technical assistance needed to ensure successful performance.

Much of the work that is reported in this extensive study will not need to be duplicated in the future. However, some elements of the research have exposed areas of continuing need for marketing studies. Periodic measurement of consumer behavior, particularly the differences in consumption and shopping propensities among different income levels both in the urban and rural areas, merits consideration. Periodic studies in depth of the expectations and attitudes toward change of traditional and modern retail operators also merit review. A continuous monitoring of the real prices for critical consumer items in different kinds of outlets is suggested also. Studies then of farm input marketing channels as well as farm product marketing channels deserve periodic reappraisal. Through these periodic studies, the research and advisory group in SUDENE will be able to identify opportunities for reform. In addition to those identified by the analytical approaches of the researchers, there will very likely be many reform options identified by political and bureaucratic officials of the government. These suggestions can be evaluated by simulation techniques developed along with the reform options derived by the research teams. One must be aware, of course, that model simulations, as tools of analysis, can be used to evaluate options, but could also be exploited to prove a point in the hands of unskilled or unscrupulous people. Thus, the model "forum" should be a very open analytical discussion of the consequences of various options.

Recent organizational relationships exist in Northeast Brazil which, if fostered, could greatly improve the effectiveness of marketing development activities. Cooperation among local and state agencies as well as with the Bank of the Northeast and the Bank of Brazil can provide adequate means for supervised credit to carry forward market reform and development activities. It is our hope that market process reforms will take their place along with other critical elements in the entire developmental programs of areas

such as Northeast Brazil. However, marketing is but one aspect of the total process of development. Perhaps as a result of these studies, a more balanced program of internal market process integration can be incorporated into development planning.

Implementation of Marketing Reforms

The SUDENE/MSU marketing study has accomplished its stated and agreed-upon objectives. The role of marketing in the development of an important area of the Northeast has been described; a set of basic marketing reforms has been recommended. A system simulation model was constructed and used to demonstrate the evaluation of basic reform options.

The problem of how to proceed on the basis of the marketing research now becomes important. Unfortunately, there is as yet no sustaining tradition for the implementation of marketing development programs.

Moreover, before detailed implementation planning can begin, a determination must be made of the priority to be attached to marketing development programs in the context of alternative development strategies. The SUDENE/MSU study, as well as SUDENE's own prior diagnoses of regional problems, have substantiated the critical importance of market processes in Northeast development. Assuming, however, that marketing improvements will be given high priority among the necessary tasks of regional development, answers to the following types of questions will have to be found.

1. Is the description and diagnosis of the marketing system reasonably accurate?

2. Are the recommendations reasonable in light of the research findings?

3. Are the recommendations feasible and desirable in the context of existing development policies and the social and political constraints of the Northeast?

4. What modifications and additions are needed in the proposed marketing reform programs?

5. Do existing institutions have the personnel, resources and authority to implement the reform program? If not, what modifications should be made in existing institutions and what new institutional arrangements are needed?

Appropriate Brazilian agencies will need to detail the reform activities. The complete research report provides some preliminary

specifications of the tasks to be done and the resource requirements. However, these must be further refined and modified to conform to the policies laid down by administrators in SUDENE and other Brazilian government agencies.

As the implementation activities get under way, attention must be given to continuing research activities to guide and monitor the market development program. A continuing program of information gathering, decision-making, program planning and implementation must be the format for effective development efforts in the area of marketing.

A Final Comment Regarding Organization for Reform Planning and Implementation

Throughout this summary chapter, emphasis has been given to the intersectorial processes of development and to the systems of exchange between rural areas and urban centers. The simulation model was used to demonstrate that the benefits of marketing reforms are increased as the reforms are expanded to embrace the exchange processes permeating the entire economic system. However, in the Northeast, as in most developing communities, planning activities are organized along vertical sectorial lines, namely agriculture, industry, infrastructure, natural and human resources. The marketing orientation to development planning, as it has been described in this summary, necessarily imposes a horizontal, cross-sectorial view of the general development process. The marketing orientation therefore implies the need for an integrated, comprehensive planning unit which would be free of exclusive bureaucratic or professional allegiance to a single sector or sub-sector of the economic system.

To recommend how such a market planning unit might be established within SUDENE or any other Brazilian agency is clearly beyond the purposes of the SUDENE/MSU research. Nevertheless, the need for a planning organization of this kind will probably become evident if the recommended marketing orientation to development planning is accepted.

APPENDIX A

METHODOLOGY

General Procedures

The conceptual framework and the problem-solving orientation of this research were described in Chapter 1. The specific objectives were presented on Page 18 of that chapter.

There were five phases in the research work plan:

1. Preliminary investigations, including review of previous studies, interviews with public officials, examination of secondary data, direct observation, and detailed interviews with market participants.

2. Plan and conduct structured interviews with systematic samples of market participants and through special studies.

3. Tabulate and analyze survey data.

4. Design and test a system simulation model of market processes in the Recife area.

5. Prepare a report summarizing the findings and recommendations.

The procedures for organizing and conducting the surveys of market participants are described below.

Survey Research Procedures

During the first phase of work, project personnel carried out about 125 exploratory interviews with market participants in order to observe first hand the operation of the marketing system. Members of the five institutional groups (consumers, retailers, wholesalers, assemblers, farmers) plus other agencies and individuals of importance in understanding Recife's market processes were interviewed. Some of the important government agencies whose personnel participated in discussions with project staff were: the Bank of the Northeast, SUNAB, CANESA, the Bank of Brazil, State Secretaries of Agriculture, State Development Banks, the Preifeitura of Recife, agricultural research and extension agencies, and the Ministry of Agriculture.

These informal interviews enabled staff members to decide what kinds of information would be needed in more detail, and how to go about obtaining that data. Thus, by the time work began on the

second phase, a large number of questions had been formulated for possible inclusion in the various questionnaires. These questions were then pulled together into draft questionnaires for internal discussion.

In the next step, the draft questionnaires were edited and prepared for pre-testing. The questionnaire drafts were produced in both English and Portuguese. Next, the questionnaires were translated into colloquial Portuguese; Brazilian technicians familiar with the local community were relied upon heavily during this process.

To pre-test the questionnaires, a sample of 20 to 30 respondents was selected from the relevant groups of farmers, assemblers, retailer-wholesalers, and consumers. These pre-test interviews were largely carried out by the Brazilian research technicians, with Michigan State University staff as observers. This afforded the opportunity to observe respondent reaction to each question and to make notes on the kinds of changes needed to make wording clearer, to eliminate duplication, and to improve the organization of the questionnaire. After the first pre-test, corrections were incorporated into a third draft of the questionnaires and a second pre-test was carried out on a smaller scale, this time using student interviewers with project technicians along for observation. This provided supervised training for interviewers while at the same time permitting a final test for the wording of questions and organization of the questionnaire. With the final set of questions in hand, it was then possible to proceed with the planning of IBM card layouts and questionnaire precoding for punching.

A final edit was made of all aspects of the survey instruments, including content, wording, punctuation and precoding. The questionnaires were reproduced in sufficient quantities to fulfill sampling requirements and to leave extra copies for other uses.

As work proceeded on questionnaire design, recruiting of interviewers began. It was decided that advanced economics students would make suitable interviewers. Accordingly, an arrangement was made with the Faculty of Economics of the Federal University of Pernambuco whereby the Institute for Economic Research would assist in recruiting economics students and would coordinate with faculty members in order to obtain special permission for interviewers who might miss classes. Since sufficient interviewer candidates were not available from the Faculty of Economics alone, students were also recruited from the Faculty of Business Administration and Sociology. Eventually, 40 students were selected for interviewing work.

These included eleven girls who were used exclusively in retailer, wholesaler and consumer interviewing and who were found to be able to establish excellent rapport with respondents.

The interviewer training phase included six aspects:

1. a review of the role of marketing in the economic development process,

2. an explanation of the specific purpose of the research,

3. a review of scientific research methods and the importance of strict control procedures in order to avoid bias in survey data,

4. general instructions on the techniques of interviewing,

5. explanations of special ways to handle particular questions in the questionnaires, and

6. practice interviews in the presence of technicians who could correct any error observed in the technique.

Interviewers were divided into two groups, one of which concentrated on rural interviews and the other on urban interviews. Within each group, interviewer teams of three to five persons were assembled. In the rural group, one interviewer was designated as crew supervisor, and was responsible for assignment of interviews and general supervision. He collected the completed questionnaires and returned them to one of the research technicians supervising his work; then he field-edited the completed questionnaires. In the urban areas, the interviewer teams were divided into three teams, with a full-time supervisor in charge of each team. Those supervisors were given the responsibility of interview assignments and initial editing of completed questionnaires.

When completed questionnaires were returned to the project office, they were edited by a group of coders to check the interviewer's coding. These coders were also responsible for making certain calculations from the questionnaires, and for recording that information. Finally, the coders converted *cruzeiro* and unit numbers into the proper digits for IBM punching, and coded open-ended questions.

The final step in the field interview process was the transfer of data to punch cards by IBM of Recife. Each card was then machine verified by IBM and listings were provided which were checked by project personnel for missing cards, duplications, and blanks. The data were transferred to magnetic tapes and sent to

Michigan State University for analysis on a CDC 3600 computer. The original source data remained with the project personnel in Recife.

In addition to the depth interviews, some 2,350 field interviews were completed by the research team. The interviews averaged slightly over one hour each. A breakdown of the number of interviews for each survey group is shown in Table A.1 below.

Table A.1 Number of Interviews Completed by Survey Type and Commodity

Survey and Commodity	Number of Interviews Completed
Consumers	354
Retailers	
Fair Stall Operators	210
Fixed Fair Operators	75
Public Market Operators	100
Neighborhood Store Operators	447
Supermarkets and *Mercadinhos*	43
Consumer Cooperatives	11
Large Meat Dealers	5
Wholesalers	
Public Market and Fixed Fair Wholesalers	66
Large Food Wholesalers	70
Farmers	
Rice	154
Beans	177
Manioc	151
Cotton	165
Milk	126
Assemblers	
Rice	42
Beans	59
Manioc	22
Cotton	46
Farm Input Distributors	27
TOTAL	2,350

The Recife Consumer and Food Distributor Surveys

The data collection for the urban retail, wholesale and consumer surveys can be divided into three steps: depth interviews, structured surveys, and special studies.

Depth interviews, as noted previously, consisted of a series of exploratory interviews. The principal institutions related to the marketing process were interviewed, including government agencies from the local government to the federal level; private institutions, such as banks; consumers; and the actual marketers themselves.

Interview guides were used to ensure that the same areas and relevant areas of information were covered during the interview. Detailed information was gained about eight areas of inquiry.

1. Observational Information--This included observations concerning physical characteristics of the business, locational characteristics, functional characteristics, etc.

2. General Operation--This included such topics as organizational structure and ownership, history of the business, and operating characteristics.

3. Products Handled--For each product handled, supply volumes, prices, and conditions were obtained; functions performed on the products were recorded; and selling prices and practices were asked about.

4. Outputs of Business and Customers--The characteristics of the customers as perceived by the channel member were obtained, as well as the selling practices and behaviors. Communications and advertising practices were reviewed. Finally, competition and competitive behaviors were discussed.

5. Inputs into Business--Labor characteristics, investment levels and practices, and supplier characteristics and relationships were areas of interest.

6. Change and Attitudes--This area inquired into the change process within the business and the attitudes and aspirations of the decision-makers.

7. Government Influence--The importance of government influence or lack of influence was asked for.

8. Internal Characteristics--This area included sales and costs of business, record-keeping methods, family characteristics of the decision-maker, etc.

This phase built a background of knowledge about the system so that the second phase could be developed around the relevant issues and in a manner acceptable to the respondents. The sample

for the depth interviews was selected by judgment and the results were not tabulated and reported as being representative of the system. However, the results were used to add insight to the survey data where appropriate.

The survey research was built upon the base developed through depth interviews. Surveys of three major populations were made: consumers, retailers, and wholesalers. The retailer population was broken down into the following sub-populations:

1. Street Fairs
2. Public Markets
3. Fixed Fairs
4. Neighborhood Retailers
5. Self-Service Retailers
6. Retail Cooperatives
7. Large Meat Dealers

Because of the economic and educational differences between these sub-populations, it was necessary to develop three different questionnaires, though most of the question content was identical between the three. The questionnaire development reflected the work carried on previously in Puerto Rico. Street fair operators were given the least complex questionnaire, which was tailored to the market fair kind of retailing. Fixed fair, public market, and neighborhood retailers were given a somewhat more complex questionnaire, which was also adjusted to the fixed location retailing. Finally, the rest of the sub-populations were given the most complex questionnaire, which was suited for the more complicated opertions they ran. All the questionnaires were pre-tested at least twice, with the street fair questionnaire being revised and pretested the most because of the difficulty in phrasing meaningful questions to these respondents.

The sample design varied for each of the sub-populations depending on the population characteristics, but in all cases met the test of being statistically representative of the sub-population in such a way that the sub-population samples could be combined to represent the total population of retailers. Because there were no lists of retailers available to use as a sample frame, it was necessary to design the sample so that it was self-generating in the field, and which by definition included an accurate representation of the populations. This was achieved in two ways. First, the city was divided into 26 subdivisions, with a *feira* in each area. Ten of those areas were randomly selected after stratifying by income

level, geographic location, and size of the street fair. The street fair within each of the 10 areas selected was then sampled by a procedure of passing through the *feira* interviewing the operators according to a predetermined skip interval after taking a random start.

Neighborhood retailers were interviewed in a similar manner: the interviewer, in a prescribed pattern, passed by every neighborhood store and took interviews according to a predetermined skip interval given a random start. Hence, whatever existed in the population was systematically sampled. All public markets and fixed *feiras* in the 26 areas were sampled in the same way by the use of the skip interval following a random start in each market. This design for these sub-populations was dependent on the interviewer or team of interviewers passing by each retailer and selecting according to a predetermined interval of appropriate interviews to be made.

The second research design applies to the self-service stores, cooperatives, and large meat dealers, and was a census of all in these populations. This census was necessary because of the small numbers in these populations.

The wholesalers were divided into two sub-populations--market wholesalers or stall operators in markets, and established wholesalers or individually located businessmen. The middle level retailers' questionnaire was revised for the market wholesalers, while the most complex retailers' questionnaire was revised for the established wholesalers. Each questionnaire was pre-tested, revised, and tested again. The sample design for the wholesalers was like that for the fixed *feiras* and public market retailers, except the skip interval was altered to give a 75% sample, i.e., the interviewer made three interviews in a row, then skipped one, then made three more, etc. For the established wholesalers, the skip interval was used on a list of wholesalers which was compiled by the research team rather than in the field.

The research design for the consumers followed the same procedure as that of the retailers. The questionnaire was pre-tested and revised, and pre-tested twice more before it was considered ready for use. The sample design used the same 10 city subdivisions selected earlier for sampling *feiras*. All family units in these areas were listed from the Instituto Brasileiro do Geografia y Estatistica (IBGE) school census in 1964, and then a predetermined skip interval was used to select the family units for the surveys. In all cases, the female head of the household was interviewed.

In conclusion, the sample designs for the structured surveys were built on the criteria of representativeness, even though an unequal probability design was largely used. It should be noted that three call-backs were used throughout for unavailable respondents, and there was no replacement for non-respondents except in the case of the market wholesalers, where sample size was critical.

Special studies were conducted as a follow-up to the structured surveys. These included a market basket price study, a retail dairy study, and further depth interviews. The purpose of these studies was to obtain information that the survey phase was unable to get. Such information included the actual prices paid by consumers, the social function of the various retail institutions, and the dynamics of the change process in which Recife finds itself.

The Farmer and Input Distributor Surveys

As already stated, a major objective of this research project was to make a thorough study of the food and non-food marketing system in a selected urban area and the rural marketing system which supplies that urban market. Since the urban market being studied was that of Recife, the appropriate rural areas to be studied were those which produced, assembled, and transported goods for the Recife urban market. In other words, the relevant rural areas to be studied were those which lie in the foodshed area of the Recife urban market. The intent of this section is (1) to briefly describe the content of the final questionnaire and (2) to describe more fully the methodology used to identify these rural supply channels.

Questionnaire Content

The questionnaire contained information relevant to the academic areas of agricultural economics, marketing, and communications. The basic orientation of the questions used from these disciplines is directed toward the description, analysis, and suggestion of reform alternatives for the Recife urban market and related rural markets.

Two farm questionnaires were constructed. The first was used for rice, beans, cotton and manioc, with little modification from one crop to the other. A second questionnaire was devised for milk because of the different needs which became apparent during the pretesting of questionnaires.

The farm questionnaires contained eight basic sections. Section I was concerned only with identification and control information for the questionnaire and the respondent. Items such as name, address, date and screening questions were included.

Section II focused on the economic organization and production of the farm unit. It included questions on the area planted to various crops over a three year period, the amount harvested and the amount sold of the commodity being studied, and an inventory of the livestock on the farm.

Section III covered purchased inputs being used on the farm, off-farm employment of owner and family, sources and use of farm credit, ownership of selected consumer goods, attitudes toward fertilizer use, and food purchases of the family. Section III provided the information necessary to determine the extent of present farm input markets and the factors preventing more extensive use of modern farming techniques.

Section IV included questions about where and how they go to *feiras*, advance-selling of products, four transactions in which the month, price, quantity and to whom sold were obtained, sources of price information, price responsiveness and on-farm storage practices. The marketing section supplied the data needed to describe commodity flows and evaluate the nature of market coordination in the system.

Section V included the attitude questions designed to test trust, modernity, familism, fatalism, risk, etc., all of which are basic to determining the likelihood of these people adopting marketing reforms and/or production innovations. It may also point out the conditions which need to be changed before a reform can be implemented.

Section VI covered the personal characteristics of the respondent, such as age, education, and family size.

Section VII, communication, dealt with literacy, exposure to mass media such as radio, newspapers, television and attendance at extension meetings. Such information reveals the channels of communication which could be used most effectively to implement reforms.

The final section (VIII) included observations of the interviewer about type of house construction, electricity on the farm, and the truthfulness of the respondent.

The Farmer Populations

The source of our producer population lists for the farm interviews was a 1965-1966 cadastral survey made by IBRA (Instituto

Brasileiro do Reforma Agraria). This cadastral survey contained a list of property owners by *municipios* (for nearly all the *municipios* in the Northeast). The IBRA cadastral survey was selected because of its advantages in the amount of information contained, newness and completeness. Although IBRA officials estimated that their tax lists included only 50% to 90% of the farms in any given *municipio*, it was considered to be the best source of information available for sampling purposes.

The sample drawn was a landowner sample in selected production areas of the Northeast. Emphasis was placed upon landowners, since they make the important production and marketing decisions on farms in the Northeast. This does not deny the importance of the land tenure problem in the Northeast, but rather, a comprehensive study of land tenure arrangements was beyond the scope of the marketing study.

Farmer Sample Selection

The research agreement between SUDENE and Michigan State University identified five basic commodities--rice, beans, manioc, cotton, and milk--to be studied. The production areas supplying the Recife urban market for these five basic commodities were studied.

For each commodity, major supply areas for the Recife market were identified by *municipio*, drawing on three sources of information. Interviews with Recife wholesalers were used to identify supply areas. Field trips were made to these areas by MSU-SUDENE staff members to gain greater understanding of the market processes. Finally, the results of a SUDENE/Ministry of Agriculture study carried out in 1967 provided production estimates by *municipio* for the 1965-66 harvest and also information on geographic location of sales for basic commodities.

The criteria used for selection of the *municipios* were as follows:

1. The *municipio* must be in the Northeast.
2. The *municipio* must have a certain minimum level of production.
3. The *municipio* must produce more than what is consumed by the population within the *municipio*.
4. The *municipio* must export part of its production to the urban market of Recife.

With these criteria, a list of the possible *municipios* for interviewing work was prepared. This list served as the population from which the farm sample was drawn. In this study, the list varied from 10 to 14 *municipios* for each commodity. There was no set number of *municipios* which had to be used; larger or smaller numbers could easily be incorporated into the design.

The list of *municipios* was then ranked (largest first) according to estimated production for the 1966 harvest. When necessary, the ranking was also done by states to allow for differences in transportation, technical assistance and credit availability which were said to exist among the various states.

A probability sample was used to select *municipios* from the population list in which to conduct farm interviews. To ensure representativeness of the sample and, at the same time, to stay within the time and travel constraints of this study in rural areas of the Northeast, three of four *municipios* were sampled. The probability that a particular *municipio* would be selected equaled a ratio of that *municipio's* production over the total production in all the *municipios* making up the population lists. Because of the wide range of variability in the production among *municipios*, a rule was made that if any one *municipio* had a production equal to or greater than 1/3 of the total production of all *municipios* in the population, then it would automatically be included in our sample. In this case, only two additional *municipios* were selected using our calculated probabilities. Using a random start, the *municipios* were sampled from the population list.

As noted above, the probability that a given *municipio* would be included in the sample varied according to the volume of the product produced in that *municipio*. Yet all producers in the population of *municipios*, including those which were not drawn for sampling purposes, had the same random probability of entering into the producer sample. This was accomplished through a formula which adjusted sample size within the *municipios* according to the probability of that *municipio* being selected from among the list of *municipios*. All other things being equal, the greater the probability of the *municipio* being selected, the smaller will be the sample size within that *municipio*, and vice versa. The formula used was $(Pm)\ (F_w) = f_t$ where Pm is the probability of a given *municipio* being selected and F_w is the sampling fraction. (This sampling procedure was developed after personal consultation with Mr. R. Goodman, Consulting Statistician of the U.N. for Latin America, based in Santiago, Chile. For additional detail, see a mimeographed statement

on survey methodology in Latin American Market Planning Center, Michigan State University, East Lansing, Michigan.) In the above formula, there are two knowns, Pm and f_t, and F_w is the only unknown. Pm is given once and the *municipios* are randomly selected and f_t is arbitrarily determined by the sampling fraction desired for each area or commodity. In our farm interviewing, the sampling fraction was set at 1.4% of the population. With Pm and f_t determined, the equation can be solved for F_w, which is the sampling fraction within a particular *municipio*. Using this formula, the sample size for each sampled *municipio* was determined for each commodity. This figure was then adjusted so that the final sample size in all the *municipios* selected produced an over-all sampling fraction of 1.4%.

Given the sample size within each *municipio*, a skip interval was calculated for each. The skip interval equaled the number of interviews desired in each *municipio* divided by the number of producers in that same *municipio*. Using a random start, the producer sample could then be drawn. The producer sample for each *municipio* was over-sampled beyond the desired number of interviews by 25% to allow for uncompleted interviews in the rural areas due to inaccuracies of the IBRA list, irrelevant (to us) farm sales, people moving away, refusals to cooperate, etc. If this margin of over-sampling was not adequate, even with one call-back, to provide the desired number of interviews in each *municipio*, a system of replacement sampling was then developed for use in the field. Once the original sample was used up, a replacement sample was randomly drawn, also with a 25% margin. This provided the names needed to achieve the desired number of interviews per *municipio*.

Input Distribution Sample

The rural areas in which input distributors were surveyed were the same areas in which farm interviewing was done. A list of input distributors in these areas was compiled using two basic sources. First, a list of firms selling these inputs was compiled from those registered with Dunn and Bradstreet as of 1966. Secondly, a list of firms in each area was compiled in the field to supplement the Dunn and Bradstreet list. Input distributors were then systematically selected for interviewing by giving preference to those who sold modern farm inputs such as fertilizers and insecticides. A total of 30 interviews was completed.

The Assembler Surveys

In order to describe and evaluate the marketing system between major supply areas and Recife for the five commodities, it was necessary to interview a cross-section of assemblers and processors in the rural areas where farmer sampling was done. Since no comprehensive lists of such rural assemblers and processors could be located, project personnel developed population frames in each *municipio* selected for farmer sampling as well as for major marketing centers in the area. The major sources of information for developing these population lists were local public servants, community leaders, and assemblers.

As population lists were developed, firms were classified according to volume of product handled and position in the market channel. The criteria for stratification are discussed below.

1. The first stratum is called "large coordinated assemblers." These were basically those assembly firms which made a regular practice of bypassing one or more of the traditional assembler levels. In the case of rice, they sell to large retailers. Coordinated bean assemblers sell directly to Recife wholesalers. There are no coordinated manioc assemblers.

2. The second stratum is labeled "medium-sized urban assemblers." These assemblers buy principally in the convergence centers and sell through regular market channels rather than bypassing certain assemblers.

3. "Medium-sized rural assemblers" are located in convergence centers and buy in the surrounding *municipios* and *feiras*. These firms also generally sell to larger assemblers.

4. The fourth stratum, labeled "small urban assemblers," is made up of assemblers located in county seats or smaller towns. The volume of product handled by such firms is slightly less than medium-sized assemblers. Their purchases are made from other assemblers or farmers within the *municipio* in which the firm is located.

5. "Small rural assemblers" handle about the same volume as small urban assemblers but are located in small villages or in rural areas. Frequently these assemblers own neighborhood stores and exchange supplies for the farmers' commodities. In other cases, small rural assemblers are farmers who make purchases from neighbors.

6. The sixth stratum is made up exclusively of "itinerant assemblers." These are those product buyers with their own trucks or those who rent transportation in

order to travel from one rural area to another making purchases from farmers or most often from other assemblers. Population lists for this stratum were quite inadequate due to the difficulty of locating such assemblers.

After stratification, random samples were drawn in each survey, using a higher sampling rate among large and medium-sized assemblers. When the assembler survey data were tabulated, weighting was applied in order to correct for the high sampling rate among large and medium-sized assemblers. This assured equal representation for each of the strata and at the same time guaranteed the inclusion of the larger and more influential assembly firms.

The Industrial Survey

Identification of the Universe

In order to shed additional light on internal market development processes, those industries and firms which met one or more of the following criteria were included in the industrial survey.

1. The firm must produce and sell consumer goods to Recife and/or its foodshed. Such non-food consumer goods provide an incentive for participants in the economy to produce more so as to increase their income and standard of living. The marketing of such non-foods was studied in the urban market system.

2. The firm must be involved in food processing, the majority of such output being for Recife and its foodshed. Such firms not only supply foods such as milk, meat and bread in the area, but also use raw materials produced in the Recife foodshed. Thus, such firms' suppliers are studied from the perspective of the rural market system. Furthermore, the sales of such firms are studied as part of the urban market system.

3. The last category is made up of manufacturers of farm inputs such as fertilizers, irrigation tubes and implements. These manufacturing firms sell their products to the rural areas in the foodshed and are a potential influence on the productivity and propensity for farmers to change.

The Recife firms qualifying under these conditions are grouped into three broad categories: food processing, farm inputs, and consumer goods. The firms making up the industries included in each category were selected from a comprehensive list. This list included all manufacturing firms located in greater Recife and combined lists provided by SUDENE's Department of Industry, USAID, the U.S. consulate, Dunn and Bradstreet, FUNDINOR and the Recife telephone directory.

Each of the firms had to meet one of the criteria listed. In every industry but the wheat processing, consumer goods, and furniture industries, all firms were interviewed. In those three industries, due to the existence of many firms, the procedure adopted included interviewing the dominant firms and a randomly selected sample of the other firms.

Questionnaire Content

The interview procedure followed in studying the firms included between one and four three-hour discussions with managers and/or owners of the firm. The managers interviewed were responsible for the firms' production activities, marketing and sales efforts and financial aspects. Such individuals are usually in the best position to provide the information sought and, in general, were very cooperative.

Four areas of information concerning the firms' operations and decision procedures included:

1. the perceived effect on the firms' operations due to activities of competitors,

2. the nature of the firms' relationships with their suppliers of raw materials,

3. the character of the firms' marketing distribution activities and the importance of such activities in the firms' operations, and

4. some factors related to the internal operations of the firms. The data from these interviews was hand tabulated and analyzed along with information on the use of 34/18 investment funds from SUDENE, Dunn and Bradstreet reports, and general information from FUNDINOR and government statistical publications.

APPENDIX B

THE RECIFE SYSTEMS MODEL: STRUCTURE, EQUATIONS, AND PARAMETER INPUTS

Organization of the Appendix

Appendix B is meant to serve two audiences: first, as a supplement to Chapter 11 for readers who want to analyze in more depth the structure and relationships of the model; and second, for readers interested in knowing specific parameter input information for the base simulation and reform simulations presented in Chapter 13. The Appendix is divided into three parts:

1. The general structure of the model computer program.
2. Verbal equations for each sector in the model.
3. Parameter definitions, values in all simulations, and sources of parameter information.

Those interested in more detail than is presented here related to the structure of particular sectors are referred to "A Systems Model for Market Development Planning: Northeast Brazil," an unpublished Ph.D. thesis by Thomas R. Webb. The computer program and a workbook detailing its use are also available, at cost, from the Latin American Market Planning Center at Michigan State University.

General Structure of the Model

The Model Solution

The means to obtain a solution in any time period within a simulation run is sequential in nature and not simultaneous. Thus, the model is termed "quasi-dynamic." Instead of obtaining an averaged result for each time period, the sequential solution requires inputs at the beginning of a time period and states results at the end of that time period. The results at the end of a previous time period become the initial inputs for the beginning of the next time period. Thus, for example, the sequential solution demands an input definition of income, which is the rate at which income is being generated at the beginning of a time period. After simulation for the time period, considering all changes taking place in the system, a new rate of income genera-

tion results for the end of the time period. This rate is used as the rate of income for the beginning of the next time period, and so on.

The effects of utilizing the sequential solution are that the planner has more flexibility in determining what variables or relationships "drive" the system and that disequilibrium solutions are permitted. When the model is used in short-run situations, this disequilibrium quality could be very useful.

Model Sub-routines and the Computer Program

There are four distinct types of sub-routines in the program of the model:

Algebraic Manipulation Sub-routines - These sub-routines service the model by providing efficient calculations in such areas as matrix multiplication, addition, subtraction, transposes and inverses. One particular sub-routine called "move" adds significant flexibility and efficiency to the program. Written in CDC Compass Assembly language under the drum scope system, it permits any matrix entry or systematic set of entries to be moved to another matrix of different dimensions to form a different arrangement of entries. Thus, matrix rows can be moved to columns, columns to diagonals, and a sub-set of a vector or systematically chosen set of entries to any systematically chosen set of entries in any other dimension matrix. This routine is also used to store information between time periods.* The algebraic sub-routines are written in either Fortran IV or CDC Compass Assembly language.

Internal Structure Sub-routines - These sub-routines are the primary economic sectors defined in the model: Consumption-Income, Distribution, Industry, Rural, Other Recife, and South-Import/Export. Each economic sector is a separate sub-routine built independently, then linked to the other sectors by the nature of inter-sector flows of goods and services in the system. Many different kinds of mathematical and logic statements are included in this segment of the model. There are approximately 5,000 statements in the main program and economic sub-routines. Very little direct mathematical manipulation is done, however, in any of these routines, with a large percentage of the statements being "calls" to the algebraic sub-routines. Some of the types of statements are:

1. Economic identities such as food purchases in supermarkets equaling the proportion of food expenditures

spent in supermarkets times the level of food expenditures.

2. Economic relationships, such as inputs equaling a technical coefficient times output.

3. Logic statements which permit various assumptions on location and magnitudes of flows and on relationships within economic sectors.

All relationships are deterministic in nature, but this assumption can be modified by using the PERs (planner entry routines). Also, most of the relationships are non-time variant in the internal structure of the model, which permits wide flexibility in the choice of dynamic relationships. They must, however, be incorporated in PERs, not in the internal structure. Virtually all parameter inputs are given to the model each time period so that sub-routines containing dynamic relationships can be "hooked up" to the internal structure with little difficulty. Parameter inputs, about 1,200 per time period, can be received by the internal sub-routines through exogenous input or from the PERs.

It is this segment of the computer program, the internal economic structure of the model, which is expanded in detail via verbal equations and parameter definitions, values, and sources.

Planner Entry Routines (PERs) - Clustered around the internal structure sub-routines are any number of planner entry routines which provide the primary planner focus of the model. It is through the utilization of these routines that the planner can enter the model. Essentially, they allow the flexibility to:

1. Change economic relationships in such areas as economic supply and demand rigidity, and expand functional relationships to include other variables.

2. Quantify assumptions of program implementation which relate policy variables under his control (generally not included in the internal structure) and the prime economic variables in the system.

The first is accomplished through utilization of the Decision Routines (Consumer I and Capital II) or by developing new PERs to fit particular problem analyses or hypothesized structural conditions. Thus, for example, industrial demand for labor (internally a function only of output) can be expanded by relating it to capacity and capital changes. The second is accomplished via the investment sector, where routines can be built which explicitly relate investment factors and policy variables (such as credit)

to economic variables (such as technical coefficients, margins, land yields, or spoilage) utilized in the internal structure or developed in another PER (e.g., developing a PER relating investment changes to the values of particular decision rules in the Decision Routine-Consumer I).

It was mentioned in the previous section that most of the relationships are non-time variant and all are deterministic in the internal structure of the model. The PER provides the opportunity to utilize dynamic relationships and random or probabilistic relationships. Further, while the results in any given simulation may be deterministic, there is flexibility to test distribution variability of input values and functional relationships.

Any time the model is simulated, the absence or presence of PERs determines the final economic structure assumed for that particular simulation. For example, if no explicit PER is developed for determining industrial labor demand, then the assumption within the internal structure (related only to the level of output) is in force. Frequently, however, many of these relationships can be estimated on "pencil and paper" outside the model and then time-variant parameter inputs representing the assumed relationship can be given each time period.

The parameter inputs demanded by the internal structure provide the link between the PERs and the internal structure. Further, PERs can use other input information or pull together multiple parameter inputs into one relationship as dependent or independent variables. The only requirement is that when the internal structure "needs" a parameter value it be available either from an exogenous source or from a PER.

Included in the verbal equations is a description of two PERs--the Decision Routines Consumer I and Capital II.

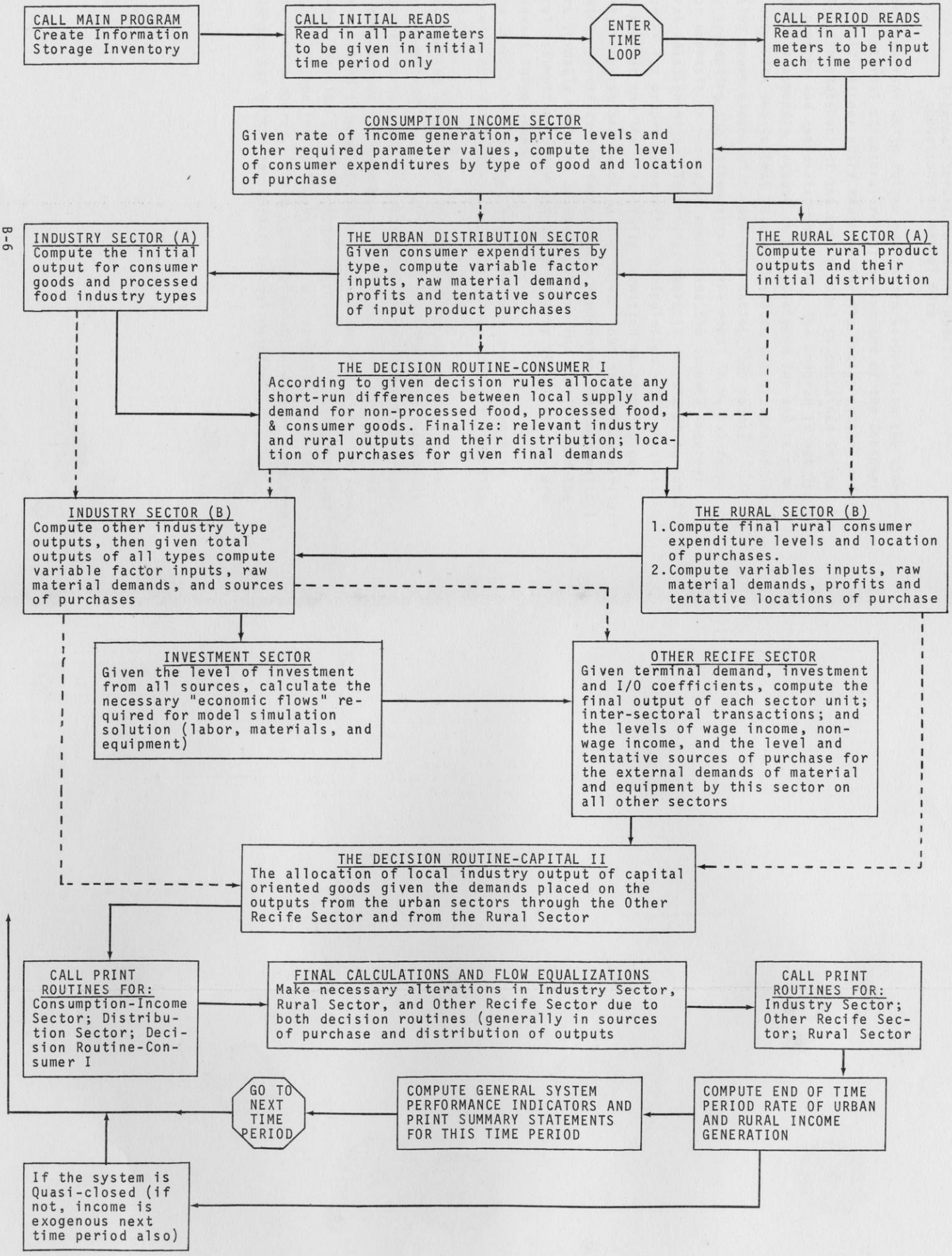
Simulation Print Routines - One of the unique features of the Recife systems model is the extensive and detailed information calculated and printed each time period of a simulation. Sixty pages of printout are generated each time period, including details of assumed input parameters, cost and profit accounting schedules, and basic economic analyses for each sector and each component within a sector of the model. Also, a brief summary analysis for the total system is presented. All results are printed in easily understood table and chart format with the exception of the Decision Routine-Consumer I. This routine utilizes a text format to clearly present the various decision rules, how they were used, and their effects.

The Computer Program - The sub-routinized structure of the computer program for the model has been outlined. The program is composed of four interrelated sets of sub-routines: algebraic service routines, internal structure sub-routines, planner entry routines, and print routines. The model can be simulated for any number of time periods, with each period run consuming about 25 seconds. The model is set up to run under the Fortran Overlay System of a Control Data 3400/3600/3800 computer system using the drum scope operating system. Using the overlay system requires about 28,000 memory units, some of which could be eliminated if greater segmentation were attempted in the overlay system. This would sacrifice significant operating efficiency. The program can be run without overlays in a minimum of 40,000 available memory units. With the exception of a few of the data manipulation routines written on CDC Compass Assembly language, all programming is in Fortran IV.

The program is structured to allow any sector or sub-set of sectors in the model to be simulated independently without alteration of the present program beyond certain control statements.

Figure B.1 presents the actual computational sequence of the Recife Systems Model solution. The solid line gives the actual sequence of the computer simulation program; the dotted line shows other information transfers between sectors in the model. Following the figure, the verbal equations are detailed.

Figure B.1 Simplified Computational Sequence for the Recife Systems Model



Internal Structure of the Model: Equations in Verbal Form

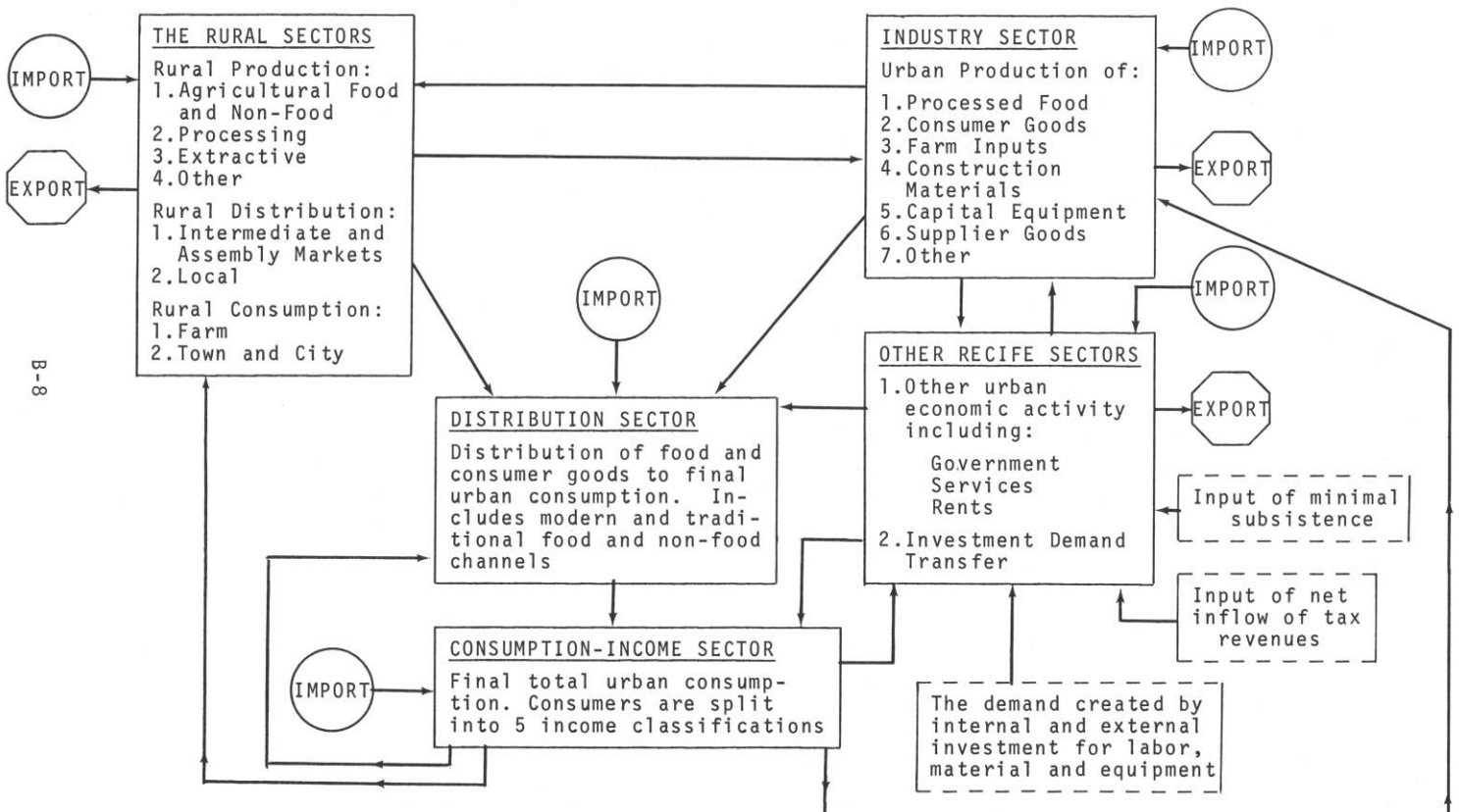
The equations which follow outline in verbal form the character of the internal structural relationships and of the Consumer I and Capital II planner entry routines for the Recife systems model. The definitive statement of the entire model is contained in the computer program and associated workbook. The program is not included in this appendix because it was developed for and is compatible only with the Control Data 3600 system and because of its length (100 pages alone; with reference tables, 300 pages).

By presenting the mathematics of the model in verbal form, the major emphasis is placed on explaining the assumed internal structural relationships. Therefore, there is no attempt to justify matrix order for proper mathematical manipulation. The abstraction from the program and the flexibility permitted in carrying out mathematical operations (such as the "move" routine defined earlier) makes matrix justification impossible. Presenting the mathematical structure formally would be exceedingly long and complex, and the structural assumptions would not be as clearly stated as they are in the verbal format used.

The chart of the general model presents the framework in which to view the relationships and identities presented verbally (Figure B.2).

Because the emphasis in this section is on presenting the economic assumptions as clearly as possible, the verbal equations are cross referenced with the discussion on parameter definitions, values, and sources presented later. All equations are numbered at the right-hand side of the page; these numbers are used in identifying the location of the equation when discussing the parameter inputs. In the section following this, all parameter definitions are listed and numbered. Where applicable, these numbers have been placed at the top of the appropriate verbal matrices.

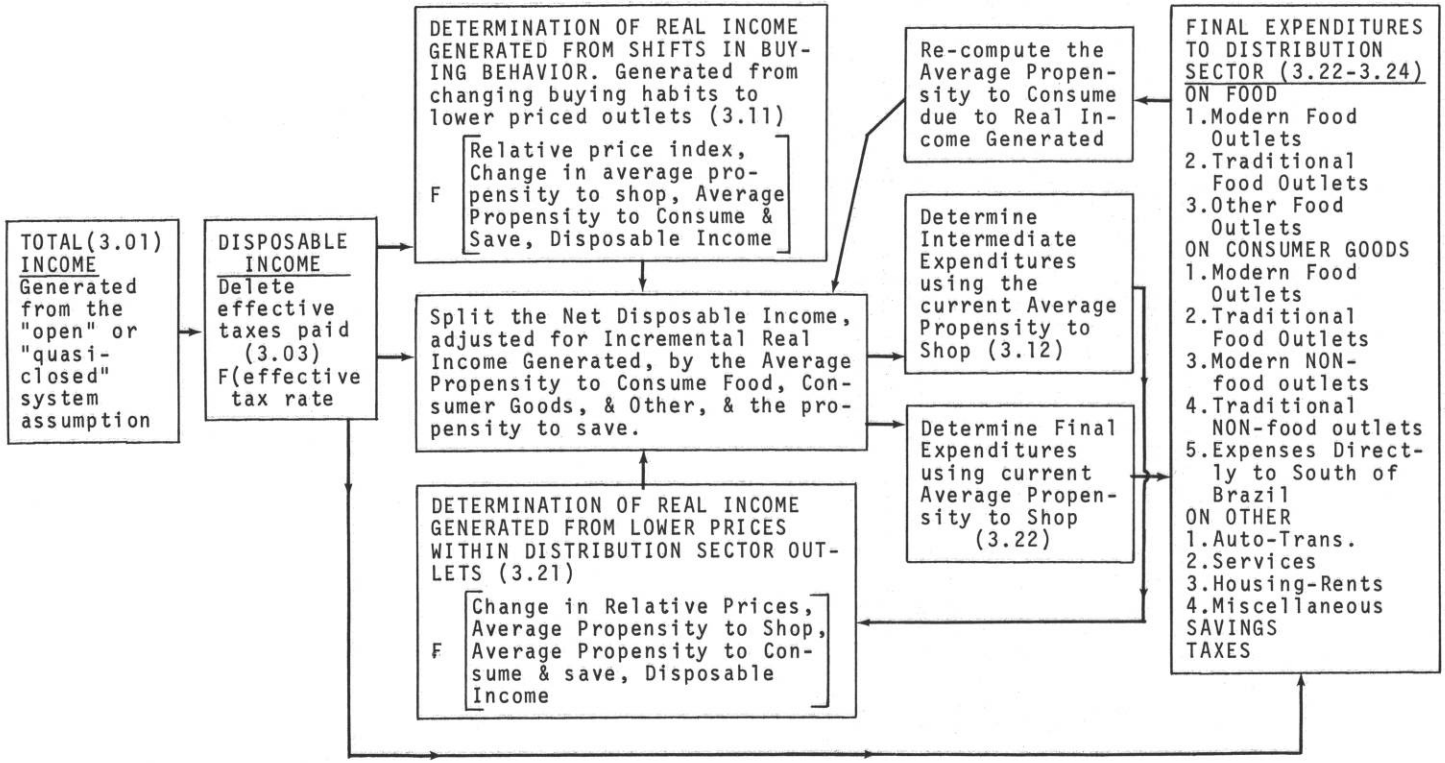
Figure B.2 The General Model Structure--Inter-Sector Flows
Recife Systems Model



The Consumption-Income Sector

The following equations represent the structure of a typical consumer type. The structure is identical for each of the five consumer classifications from very high income to very low income. The differences lie in the value of initial income and the input values of the basic parameters, such as average propensity to consume and average propensity to shop by type of outlet in the distribution sector. Figure B.3, which portrays the flow of computations, precedes the equations and shows that after disposable income is determined, incremental real income from shifting buying habits and then sequentially incremental real income from lower prices within outlets is calculated. The result gives the final value of consumer expenditures. After computations are made for each consumer class, the final expenditures are summed across all consumer types to give the total value of expenditures by the consumption-income sector by product category and location of purchase.

Figure B.3 The Consumption-Income Sector--The Flow of Computations for One Typical Consumer Classification



Determination of Consumer Income

Total Consumer Income of Jth consumer type given open system = F [(1) The rate at which total income is generated at beginning of time (t) is a known exogenous time variant input] 3.01

Total Consumer Income of Jth consumer type given a quasi-closed system (t) = F [(2) The rate at which total income is generated at beginning of time (t) is composed of contributions from all sectors in wages, distributed profits, transfers, and other income. Thus:

$$I_j(t) = \sum_{i=1}^{n} (P_i) \cdot I_i(t-1)$$

n = number of income sources
P_i = proportion of income source (i) allocated to this consumer type
$I_i(t-1)$ = rate of income generated by i^{th} source at end of last time period (t-1)

] 3.02

Disposable Consumer Income (t) = [1 - (2) The effective tax rate on total income] x Total consumer Income (less transfers) 3.03

Intermediate Determination of Expenditures for j^{th} Consumer Type

The Value of Incremental Real Income generated from changes in shopping behavior in outlets of the distribution sector. (t)

= The relative price difference between retail outlets. $1 - \frac{\text{Price in Modern}}{\text{Price in Trad.}}$ Calculated at beginning time period prices

x The change in shopping behavior from (t-1) to (t).

x APC* for food and consumer goods (t)

x Disposable Income (t)

3.11

The intermediate value of expenditures for food and consumer goods that are purchased in the distribution sector by type of retail outlet.

= (4) APS** for food and consumer goods for each retail outlet in the distribution sector.

x (3) APC for food, consumer goods

x { The SUM of incremental real income generated in modern retail outlets (Vector Σ 3.11)*** }

+ { Disposable Income (t) } - The value of incremental real income by retail outlet (equation 3.11)

3.12

* APC = average propensity to consume (program equations permit separation of APC into marginal propensity and average propensity components)

** APS = average propensity to shop

*** Vector sum of equation 3.11

The intermediate value of expenditures for the "other expenditure" category = (5) The prop. breakdown of "other expend." into: Auto-Trans. Services Home-Rent Misc. x (3) APC to consume for the "other expend." category x { The SUM of incremental real income generated in modern retail outlets (vector Σ 3.11) + Disposable Income (t) } 3.13

The intermediate value of savings = (3) The average propensity to save (t) x { The SUM of incremental real income generated in modern retail outlets from changing shopping behavior + Disposable Income (t) } 3.14

The intermediate value of expenditures directly going south (direct import) = (6) The proportion of consumer goods expenditures going directly south x (3) APC for consumer goods x { The SUM of incremental real income generated in modern retail outlets (vector Σ 3.11) + Disposable Income (t) } 3.15

The Final Determination of Expenditures for the jth Consumer Type

The Value of Incremental Real Income generated from changes in relative prices within retail outlets of the distribution sector by outlet type. (t)

= The changes in relative prices within each retail outlet from time (t-1) to time (t). Each entry is:

$$1 - \frac{\text{Price in outlet (t)}}{\text{Price in outlet (t-1)}}$$

x The intermediate value of expenditures for food and consumer goods purchased in the distribution sector by type of retail outlet (equation 3.12)

3.21

The final value of expenditures for food and consumer goods purchased in the distribution sector by type of retail outlet. (t)

= The intermediate value of expenditures for food and consumer goods (equation 3.12) + { (4) APS for food and consumer goods by retail outlet } x (3) APC for food and consumer goods

x The SUM of incremental real income generated from change in prices within retail outlets (vector Σ 3.21) } - The value of incremental real income generated from changing prices within retail outlets by outlet type (equation 3.21)

3.22

The final value of expenditures for the "other expenditure" category. (t) = The intermediate value of expenditures for the "other expend." category (equation 3.13) + { (5) The prop. breakdown of "other expend.": Auto-trans. Services Rent Misc. } x (3) APC for "other" category x { The SUM of incremental real income generated from changes in prices within retail outlets (vector Σ 3.21) }

3.23

The final value of savings. (t) = The intermediate value of savings (equation 3.14) + { (3) Average propensity to save x The SUM of incremental real income generated from changes in prices within retail outlets (vector Σ 3.21) }

3.24

The final value of expenditures directly going south (direct import) = The intermediate value of expenditures going directly south (equation 3.15 + { (6) The proportion of consumer goods expenditures going directly south x APC for consumer goods }

x { The SUM of incremental real income generated from changes in prices within retail outlets (vector Σ 3.21) }

3.25

Recomputation of Average Propensity to Consume and Save

Average propensity to consume in the following categories:
Food
Consumer Goods
Other
and the average propensity to save
are recomputed for use in (t+1)

=

Final expenditures in each of the categories from vector summation of equations 3.22, 3.23, 3.24 and 3.25, respectively

÷

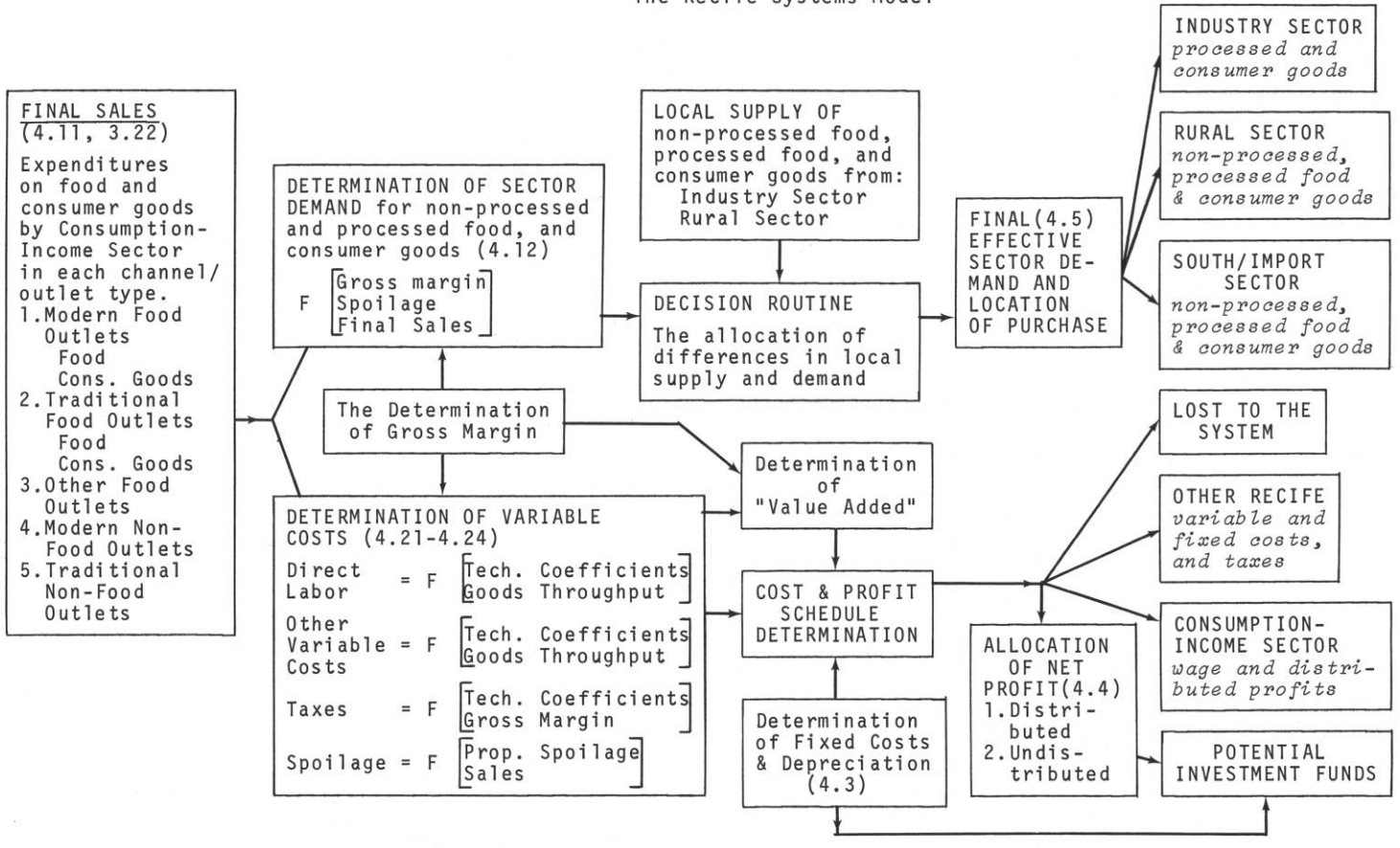
Total consumer income for the jth consumer type

3.31

The Distribution Sector

The distribution sector is composed of six separate components: modern food distribution channel, traditional street and public markets, traditional neighborhood stores, other food channels, modern non-food merchandising channel, and traditional non-food merchandising channel. Consumer non-durable goods flow through the first three food channels. Thus, there are nine distinct classifications or "product-channels." Figure B.4 illustrates the flow of computations. The verbal equations applicable to each of the nine product-channel types are presented, followed by the verbal equations for one of the nine product-channels. Differences between channels lie in the nature of the product mix and the particular values input for such parameters as labor technical coefficients, gross margin, and spoilage. Other more complex differences can be developed by utilizing PERs (planner entry routines).

Figure B.4 The Distribution Sector--Flow of Computations
The Recife Systems Model



Determination of Final Sales for k^{th} Product-Channel

The value of final sales for k^{th} product channel in time (t). = F [The summation of final consumer demand for this product in this channel over the five types of consumers defined in the Consumption-Income Sector (see equation 3.22)]

4.11

Determination of Cost of Goods, Spoilage and Gross Margin

Gross margin as a proportion of final sales (8) = [1 + The rate of spoilage as a proportion of final sales] x Mark-up per unit as a proportion of final sales - The rate of spoilage as a proportion of final sales (9)

4.21

OR

Mark-up per unit as a proportion of final sales = {Gross margin as proportion of final sales (8) + The rate of spoilage as a proportion of final sales} ÷ [1 + The rate of spoilage as a proportion of final sales]

4.22

The relative cost per input unit of this product into this channel = [1 - Gross margin as proportion of final sales] ÷ [1 + The rate of spoilage as a proportion of final sales] x Relative final price per unit index

4.23

The value of spoilage as final sale prices = The rate of spoilage as a proportion of final sales x Final sales

4.24

The value of gross margin = Gross margin as a proportion of final sales x Final sales

4.25

The value of goods throughput (sales plus spoilage) as final sale prices = $\left[1 + \begin{array}{c}\text{The rate of spoilage as a proportion of final sales}\end{array}\right]$ x Final sales

4.26

Cost of goods--the value of goods throughput as input prices = Final sales - The value of gross margin

4.27

The Value of Variable and Fixed Inputs and Depreciation

The value of direct labor wages generated = The technical coefficient for this product-channel on labor input per unit of "goods throughput" (10) x The value of "goods throughput" (equation 4.26)

4.31

The value of other variable costs = (11) The technical coefficient for this product-channel on other variable costs per unit "goods throughput" x The value of goods throughput (equation 4.26) 4.32

Total variable costs = Cost of goods + Value of direct labor wages + Value of other variable costs 4.33

The value of fixed costs = F [(13) Exogenously given to this product-channel each time period or developed in a PER where it could be made a function of such variables as number of units or capacity] 4.34

The value of depreciation = F [(15) Exogenously given each time period or developed in a PER where it could be a function of such variables as capacity, asset value and/or net investment] 4.35

The value of taxes paid = (12) The proportion which taxes are of gross margin x The value of gross margin 4.36

Determination of Value Added, Net Profits, and Profit Distribution

The value added by this product-channel = Final sales - Cost of goods - Other variable costs - Fixed costs 4.41

The value of net profit after taxes	=	Value added − Value of direct labor wages − Value of depreciation − Value of taxes paid	4.42
The value of distributed profits	=	The proportion of after-tax net profit distributed (14) × After-tax net profit	4.43
The value of undistributed net profit	=	Net profits after taxes − Distributed profits	4.44
Total consumer income generated by this product-channel	=	The value of direct labor wages paid + Distributed profits	4.45
The value of total funds available internally for investment	=	Undistributed profits + Depreciation	4.46

These calculations are carried out simultaneously for all nine product-channels. In order to determine total product input demand for the entire distribution sector, they are summed by the product types: non-processed food, processed food, and consumer goods.

Demand placed by the Distribution Sector (by sector source & by product type)

Input demand from:

Industry Sector for
- Processed Food
- Consumer Goods

Rural Sector for
- Non-processed
- Processed Food
- Consumer Goods

South/Import Sector for
- Non-processed
- Processed Food
- Consumer Goods

$$= \sum_{n=1}^{9} \left[\begin{array}{l} \text{(16)} \\ \text{The proportional split of each product-channel's demand by potential source of purchase:} \\ \text{Industry Sector} \\ \text{Rural Sector} \\ \text{South-Import/ Export Sector} \end{array} \right] \times \text{Each product-channel's demand for: non-processed food, or processed food, or consumer goods}$$

4.5

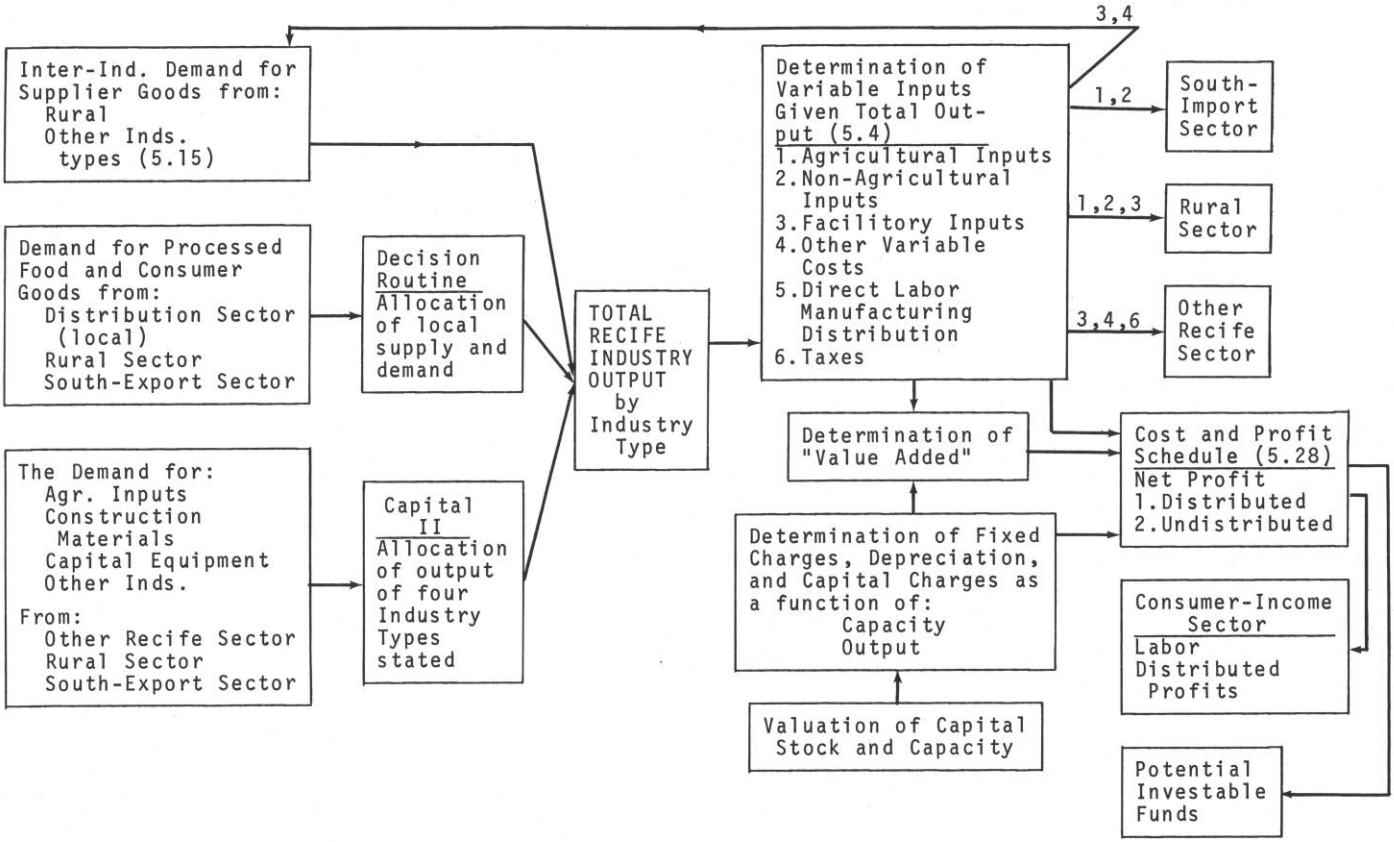
With this tentative breakdown of the demand for basic product mixes by the distribution sector, the Decision Routine-Consumer I is employed to compare local supply and demand and allocate any differences which exist according to the set of decision rules employed in the routine.

Other inputs are used in the distribution sector for comparative purposes in print-out and statistical analyses, but are not directly used in the computational format. They may, however, be used in developing PERs. These include: dollar valuation of assets, number of employees in each channel, total area, the number of economic units. All this information is developed from the Nason Thesis, Tables 3.3, 3.4, 4.1, and 4.2.

The Recife Industry Sector

The Recife industry sector consists of seven industry components: processed food, consumer goods, agricultural inputs, construction materials, capital equipment, supplier goods, and other. The assumptions and calculations are similar for all but the supplier goods industry type, where output is a function of the level of inter-industry demand generated in the sector. The Decision Routine-Consumer I is employed in determining the final output and the distribution of that output relative to local demand for the industry types of processed food and consumer goods. The Decision Routine-Capital II is used in the allocation of the output of agricultural inputs production, construction materials, capital equipment, and other industrial production. Once output is determined, the internal calculations which follow are identical for all seven industry types. See Figure B.5 for an illustration of the flow of computations in the industry sector.

Figure B.5 The Recife Industry Sector--Flow of Computations
The Recife Systems Model



Initial Output Determination

The initial expected output of each industry type in time (t) except supplier goods = [1 + (19) The expected growth rate on the output of the industry type from time (t-1)] x (18) Output of the industry type last time period (t-1)

5.11

The output of the industry supplier goods type in time period (t) = The level of intermediate demand within the firms in the industry supplier goods type + Final demand placed on this supplier goods type from other industry types and the rural sector

5.12

The level of intermediate demand = The proportion of the output of the supplier type demanded by other supplier type firms x The output of the industry supplier goods type

5.13

Final demand placed on the supplier goods types from other industry and the rural sector = {(21) The proportion of facilitory inputs used by other industry types which is demanded from the supplier goods type x (20) The technical coefficients on facilitory inputs for the other industry types} x {The output of each Industry type} + The demand placed on the supplier goods industry type from the rural sector

5.14

Industry Sector

Output of the industry supplier goods type (equation 5.12) = Final demand placed on the supplier goods industry from the other industry types and the rural sector (eq. 5.14) $\div \left[1 - \text{The proportion of the output of the supplier goods type demanded by supplier goods type firms}\right]$

5.15

Determination of the Value of Inputs and Sources of Purchase

The total demand for inputs by a given industry type

Agricultural Raw Materials
Non-agricultural Raw Materials
Facilitory Inputs
Other Variable Costs
Direct Labor Expenses in Manufacturing
Direct Labor Expenses in Distribution
Taxes Paid

= (20) The respective technical coefficients on the value of an input per unit value of output x The output of an industry type

5.21

The source of purchase for each of the inputs by industry type by location of purchase

The Other Recife Sector
The Rural Sector
The Supplier Goods Industry Type within the Industry Sector
The South/Import Sector
The Consumption-Income Sector

= (21) The respective proportions of each input which comes from each potential source x The total demand for inputs by each given industry type

Agricultural Raw Materials
Non-agricultural Raw Materials
Facilitory Inputs
Other Variable Costs
Direct Labor in Manufacturing
Direct Labor in Distribution
Taxes Paid

5.22

Determination of Value Added and Net Profits

The value added by each industry type = Final sales - Cost of goods (Agr. raw materials, Non-agr. raw materials) - Facilitory input costs and other variable costs - Fixed costs

5.31

The value of after-tax net profits = Value added - Direct labor expenses in manufacturing and distribution - Depreciation - Taxes

5.32

Distributed profits = Proportion of after-tax net profits distributed (23) x Net after-tax profits

5.33

Undistributed profits = Net after-tax profits - Distributed profits

5.34

Total consumer income generated by this industry type = Direct labor expenses in manufacturing and distribution + Distributed profits

5.35

The value of funds generated internally by this industry type for potential investment = Undistributed profits + Depreciation

5.36

Output Distribution and its Finalization

The distribution of total output for processed food and consumer goods between:
- Local Consumption
- Rural Consumption
- Exportation

= F [(22) A tentative allocation of output is made between these three receivers which may be altered in the Decision Routine I conditioned by the choice of decision rules employed]

5.41

The distribution of total output for agricultural inputs, construction materials, capital equipment, and other between:
- Local Consumption
- Rural Consumption
- Exportation

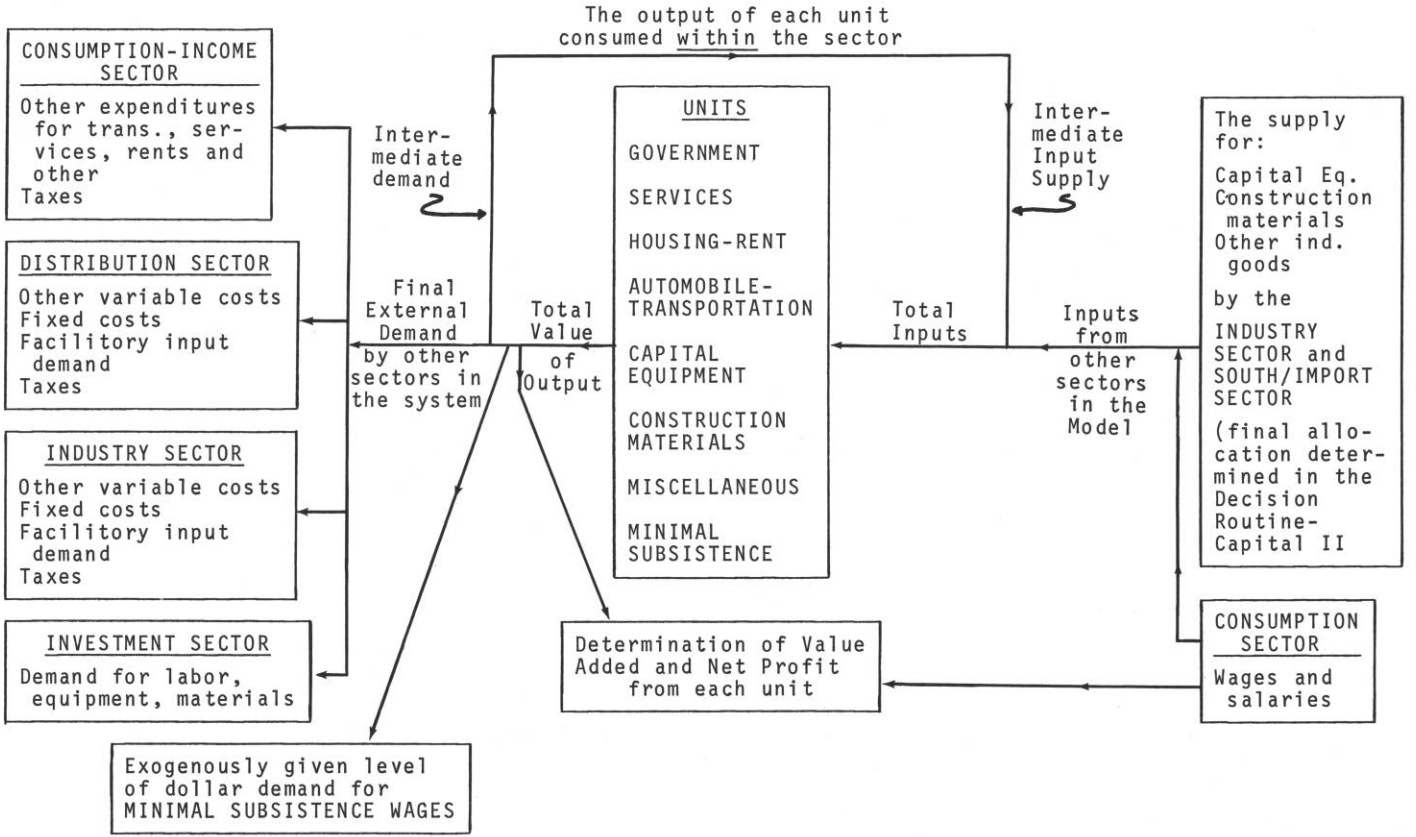
= F [The output is allocated according to the predefined rules established in the Decision Routine II, which give priority to local, then rural, and finally export demands]

5.42

The Other Recife Sector

The other Recife sector comprises the remainder of the urban economic activity in Recife. It contains the nine defined economic units as listed in Figure B.6, which illustrates the flow of computations. The sector has two major purposes: first, the rounding out of economic activity, value added, wages, and net profit distribution from other economic units and investment demand; second, the transfer of investment demand to capital goods, construction, and wages. Simple calculations are included in this explanation of the sector in order to show more clearly the structure and assumptions inherent in this conglomerate sector. In this sector the mathematical technique of the input/output matrix inversion is employed to develop the level of inter-unit or intermediate demand generated within the nine economic units of this sector.

Figure B.6 The Other Recife Sector



Determination of the Total Output of the Sector

Total output of the other Recife sector by the nine economic units (OUTPUT)	=	The intermediate demand created by transactions between the nine economic units in the sector (I.D.)	+	Final demand placed on the other Recife sector by other sectors in the economic system. (F.D.)	6.1

(24)

Final demand (F.D.) by other sectors on each of the nine units	=	The proportional allocation of terminal demand between each of the nine economic units. (C)	x	Terminal demand and transfers generated from other sectors in the economic system. (T.D.)	6.11

(25)

Intermediate demand (I.D.) from "inter-unit" transactions	=	The inter-unit transaction matrix, where each entry is the proportion of a given unit's output sold to each of the other units. (A)	x	Total output of each of the nine economic units in the sector. (OUTPUT)	6.12

Thus,

$$(OUTPUT) = (I.D.) + (F.D.) \qquad 6.1$$

$$(OUTPUT) = (A) \times (OUTPUT) + (F.D.) \qquad 6.13$$

Or,

$$(OUTPUT) = (U - A)^{-1} \times (C) \times (T.D.) \qquad 6.2$$

Verbally,

Total output of the nine economic units in the other Recife sector (OUTPUT)	=	The inverse of the "unit matrix" less the "inter-unit" transaction matrix. $(U - A)^{-1}$	x	Proportional allocation of terminal demand. (C)	x	Terminal demand (T.D.)

6.2

The Determination of the Demand placed by the Sector

Value added and external demand placed by the other Recife sector on the other sectors in the economic system (E.D.) 1. Value added (wages, net profit, depreciation) 2. Net profit after taxes (undistributed and distributed) 3. Wages generated 4. Construction materials demand transfer 5. Capital equipment demand transfer 6. Other industrial demand transfer	=	(26) The proportional allocation of value added (less taxes) between profits, wages, and depreciation and Allocation of direct investment demand transfer to wages, equipment, and material (B)	x	Total output by unit

6.3

Thus, final external demand is:

$$(E.D.) = (B) \times (U - A)^{-1} \times (C) \times (T.D.) \qquad 6.31$$

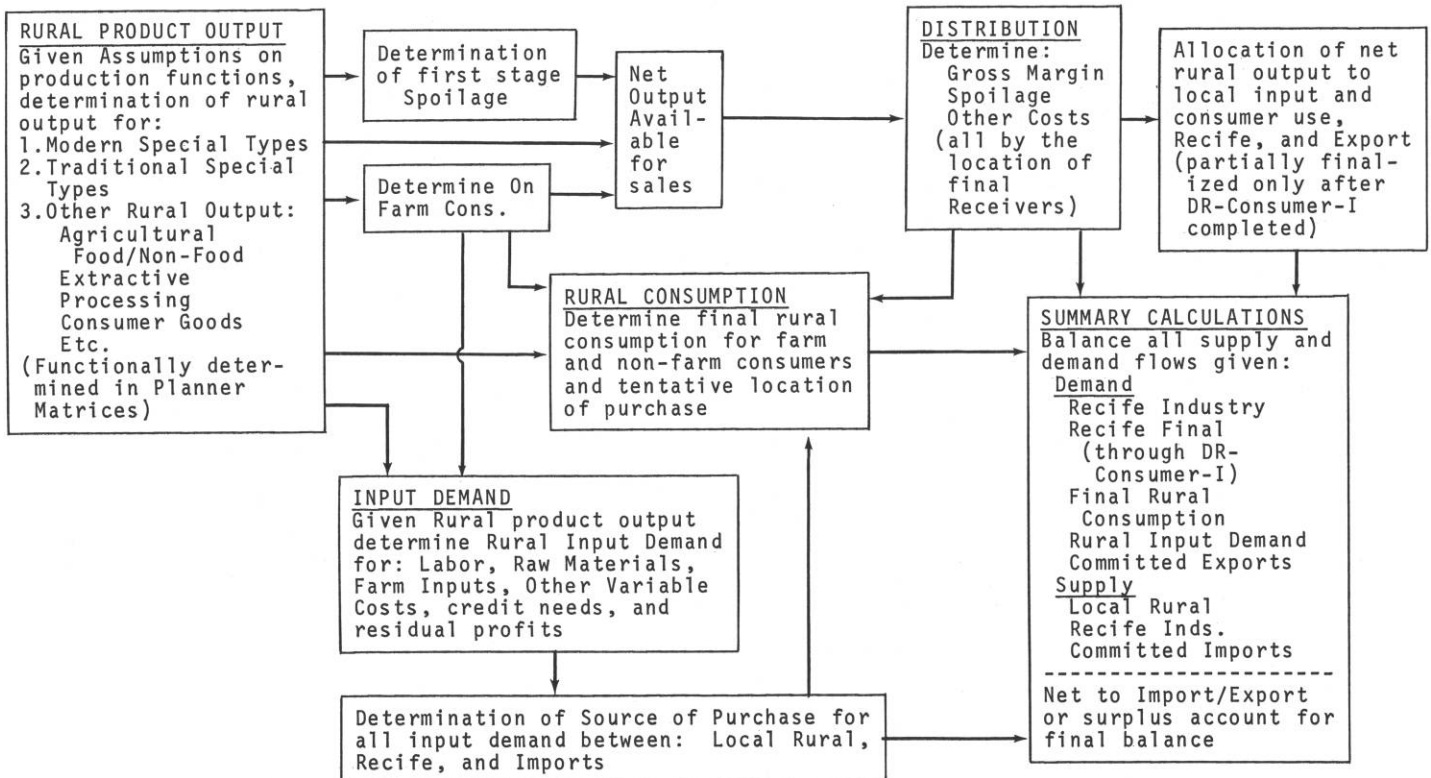
The columns in matrices (B) and (A) represent each economic unit in the other Recife sector. Each entry in a column of both matrices denotes a proportional allocation of the total output of the unit which that column represents. Thus, the sum of the column entries in (A) plus those in (B) must sum to unity, i.e., all output is allocated to inter-unit transactions, external demand, or value added. The final demand for construction materials, capital equipment, and other industrial products, generally investment oriented, go to the Decision Routine-Capital II. In that routine this total demand by the other Recife sector (representing the total demand of the urban economy for construction materials and equipment from investment) is compared to local supply from the Recife industrial sector. Excess supply is allocated to exports, excess demand to imports. (See the description of the Decision Routine-Capital II for full details.)

The Rural Sector

The rural sector is the largest sector in the model both from the standpoint of economic activity internal to the sector and from the quantity of mathematics necessary to construct its structural assumptions within the model. There are six well-defined components within the rural sector: aggregated rural production, split into four major product classes; disaggregated rural production, where up to five product groups may be defined apart from the more general output determination (for in-depth analysis of traditional-modern transformation); rural farm input distribution; rural output distribution to local consumption, Recife, and export; rural farm and non-farm consumption; and other rural economic activity (services, government, etc.). The primary links with the other sectors in the model are with the distribution sector and industry sector of urban Recife. The distribution sector is linked to the rural sector through the Decision Routine-Consumer I, which coordinates the demand placed on the rural sector for food by Recife consumers and the supply which the rural sector can make available to Recife. The industry sector has many links with the rural sector: through the input factor market, industry supplies agricultural farm inputs; through output distribution, industry demands agricultural food and non-food products from the rural sector; through the Decision Routine-Capital II, which determines the availability of investment-oriented goods from Recife relative to rural sector demand; and finally through the Decision Routine-Consumer I, where industry is in competition with the rural sector in supplying urban demand for processed food and some consumer goods.

The verbal equations which follow are divided into four categories: output determination, final consumption determination, input factor determination, and summary calculations. The summary calculations are necessary to balance supply and demand flows for the entire sector, its interaction with the rest of the system, and import/export. Figure B.7 shows the general flow of the sequential computations for the rural sector.

B.7 The Rural Sector--Simplified Flow of Computations



Output Determination

Output of modern special types (explicitly defined product groups separated for in-depth analysis = (30) Value yield of modern types defined x (31) Land area applicable to modern output defined 7.11

Output of traditional special types (explicitly defined product groups separated for in-depth analysis = (32) Value yield of traditional types defined x (33) Land area applicable to traditional output types 7.12

Other primary rural output of:
- Food
- Non-food agriculture
- Extractive
- Other

= [1 + (35) The expected growth rate on output] x (34) Output last time period 7.13

Total rural output by the four classes of production defined:
- Food
- Non-food agriculture
- Extractive
- Other

= Output of special modern types by the four product classes (eq. 7.11) + Output of special traditional types by the four product classes (eq. 7.12) + Other primary rural output by the four product classes (eq. 7.13) 7.14

Total on-farm consumption = (35) Proportion of modern output used on the farm + (36) Proportion of traditional output used on the farm + (37) Proportion of other food output used on the farm

7.15

Portion of on-farm consumption used as final consumption = Proportion of on-farm consumption in modern, traditional, and other rural food output used as final consumption x On-farm consumption by type of output: Modern Traditional Other food

7.16

On-farm consumption used as farm inputs (e.g., seeds) = Total on-farm consumption by type of rural output - Portion of on-farm consumption used for final consumption

7.17

Total on-farm spoilage (before the first sale) by type of output = (38) (39) Proportion of modern and traditional output that spoils before first sale, respectively x Output of modern special types / Output of traditional special types + (40) Proportion of other rural output by the four classes that initially is spoiled or lost x Other rural output by four output classifications

7.18

$$\text{Total value of rural output available for sale} = \text{Total rural output by product type} - \text{Total on-farm consumption (applicable to food only)} - \text{Total initial spoilage before the first sale} \qquad 7.19$$

$$\text{Distribution of rural food output to: Local rural consumption (input use and final use), Recife, South/Export} = \frac{\text{Rural food output that is available for sale} \times \text{Proportional split of output between receiving sectors}\ (42)}{1 - \text{Gross margin on the value of sales by the receiving sector}\ (48)} \qquad 7.20$$

$$\text{Distribution of all other rural output to: Local rural use, Recife, South-Export} = \frac{\text{Rural output of non-food agricultural goods, extractive and other "available" for sale} \times \text{Proportional split of the 3 types of rural output between the receiving sectors}}{1 - \text{Gross margin on the value of each type of output by the receiving sectors}} \qquad 7.21$$

$$\text{The value of** the rural output of consumer goods and processed food} = \left[1 + \text{Expected growth rate on current output}\right] \times \text{Output of consumer goods and processed foods last time period} \qquad 7.22$$

**The output of consumer goods and the processed food is part of the last classification of rural output--"other." It is split out specifically from the "other" category in order to compare and assess the impact on distribution and urban consumption through the use of the Decision Routine-Consumer I.

Spoilage or loss in rural distribution by product type and destination of goods = (41) The proportion of rural output which is available for sale that is spoiled or lost by product type and destination x Rural output available for sale by product type and destination (eq. 7.20, 7.21)

7.23

Total value of spoilage or loss in the rural sector by type of rural output at output prices = Spoilage or loss occurring before the first sale by type of output product valued at sales price + Spoilage or loss occurring in distribution by product type valued at cost of goods

7.24

Final Rural Consumption

Final consumer expenditures for:
- Food
- Consumer Goods
- Miscellaneous (services, rents)
- Taxes
- Savings

= (46) Average propensity to consume (save) each expenditure type by non-farm consumers x (44) Total income to non-farm consumers + { (47) Average propensity to consume (save) each type of expense by farm consumers } x { (45) Total income to farm consumers - On-farm consumption }

7.31

Rural Input Determination

The total value of inputs demanded by rural production for the following classifications:

1. Labor
2. Farm Inputs
3. Raw Materials Food
4. Raw Materials Non-food
5. Other Variable Costs
6. Investment-generated expenses for material equipment & labor
7. Residual net profit for income and future investment

$$= \text{(49) Input value technical coefficients on the output of the explicitly defined Special modern types} \times \text{Output of the modern types} + \text{(50) Input value technical coefficients on the output of the explicitly defined special traditional types} \times \text{Output of the traditional types} + \text{(51) Input value technical coefficients on the output of the other rural productive units} \times \text{Other rural output} \qquad 7.41$$

The breakdown of miscellaneous consumer expenses for rents and services between labor and material expenditures**

$$= \text{The proportional split of consumer miscellaneous expenses between labor and materials} \times \text{Miscellaneous consumer expenses} \qquad 7.42$$

**Add to input (1) in equation 7.41 the above value of labor expenditures, add to input (6) the above value of material expenditures, subtract from input (3) the value of on-farm consumption used as farm inputs (such as seed).

The distribution of the demand for inputs into the rural productive sector from the source sectors of: 1. Internally generated within rural sector 2. Recife industry sector 3. South-Import	=	(52) Proportional source split on each input into the three potential source sectors of purchase	x	The total value of inputs demanded by the rural sector	7.43
Investment funds available for future use or hoarding within the rural sector	=	Net savings	+	Undistributed net profits and depreciation generated internally	7.44
Total rural income generated within the rural sector both farm and non-farm	=	The value of labor demand by the rural productive sector from all sources	+	Value of income wages generated from other rural economic activity (rents, services, etc.)	
	+	Wages and income generated in distribution within the rural sector (assemblers, wholesalers and retailers)	+	The exogenous input of the value of government wages generated in the rural sector	7.45

Total value of government revenues generated	=	Personal taxes paid by consumers	+	Business taxes generated by rural production and distribution	+	The net flow of government revenues from sources outside the rural sector

7.46

Summary Calculations

Before the final determination of the allocation of outputs of the rural sector can be done, the Decision Routine-Consumer I must calculate and allocate any difference between local supply and urban demand. For this, Consumer I uses that part of equation 7.20 which is the food production allocated to Recife, and equation 7.22, which is the output of consumer goods and processed food by the rural sector. After the Decision Routine has been completed, it sends back to the rural sector these final distributions.

Before final determination of the sources of purchases for inputs can be determined, the Decision Routine-Capital II must decide if the demand placed on Recife for inputs stated in 7.43 can be fulfilled. After the Capital II has determined the allocation of the urban industry sector, it sends back to the rural sector the final supply which can be made available. Before entering the summary calculations, these alterations have already been made in the relevant decision routine calculations.

The net total demand for food products by the rural sector <u>on</u> the rural sector	=	Final consumer demand for food products, including "on-farm consumption"	+	The demand by rural production for input of food raw materials	-	Initial demand for imports by consumers and producers

7.51

The net supply of food products which the rural sector can make available to the rural sector demand = The total rural output of food - Total value of spoilage - That part of rural food output which is by its nature exported

- That part of rural food output allocated to the Recife industry sector and to final urban consumption through the distribution sector

7.52

The total value of food imports from the south-import sector by the rural sector = Initial demand for food imports (by their nature) by consumers, producers + The net total demand for food products by the rural sector - The net total supply of food products of the rural sector

7.53

The net total demand for other rural sector output = Final consumer demand for other goods + Rural productive demand for other goods - That portion of input demand initially imported

7.54

The net total supply of other goods which the rural sector can make available to meet the demand = Total rural output of all goods - Spoilage or loss - Output initially allocated to exportation

7.55

The total value of other goods imported into the rural sector	=	The value of imports initially for consumers and producers (by their nature)	+	Net total demand (eq. 7.54)	-	Net total supply (eq. 7.55)	7.56

The Decision Routines (Planner Entry Routines)

The Decision Routine-Consumer I - This routine is composed of a complex set of 500 mathematical operations, logic alternative statements, and print statements. The purpose of the routine is to allow the planner to determine the process by which short-run supply and demand for food and consumer goods are balanced according to a defined set of decision rules. The ability of Consumer I to carry out the necessary operations is important, but also stressed is the ability to present the results of using Consumer I. Thus, within the routine, a readable text format output is utilized to indicate which decision rules were used and what their impact would be on allocating any short-run surplus or deficit. Tabular summaries for the entire routine are also presented. (Over 50 print format statements are defined to achieve this result.)

The user of Consumer I inputs two kinds of parameters: first, "keys" which determine which decision statements to use; and second, the level of impact which a given decision statement can have on a surplus or deficit.

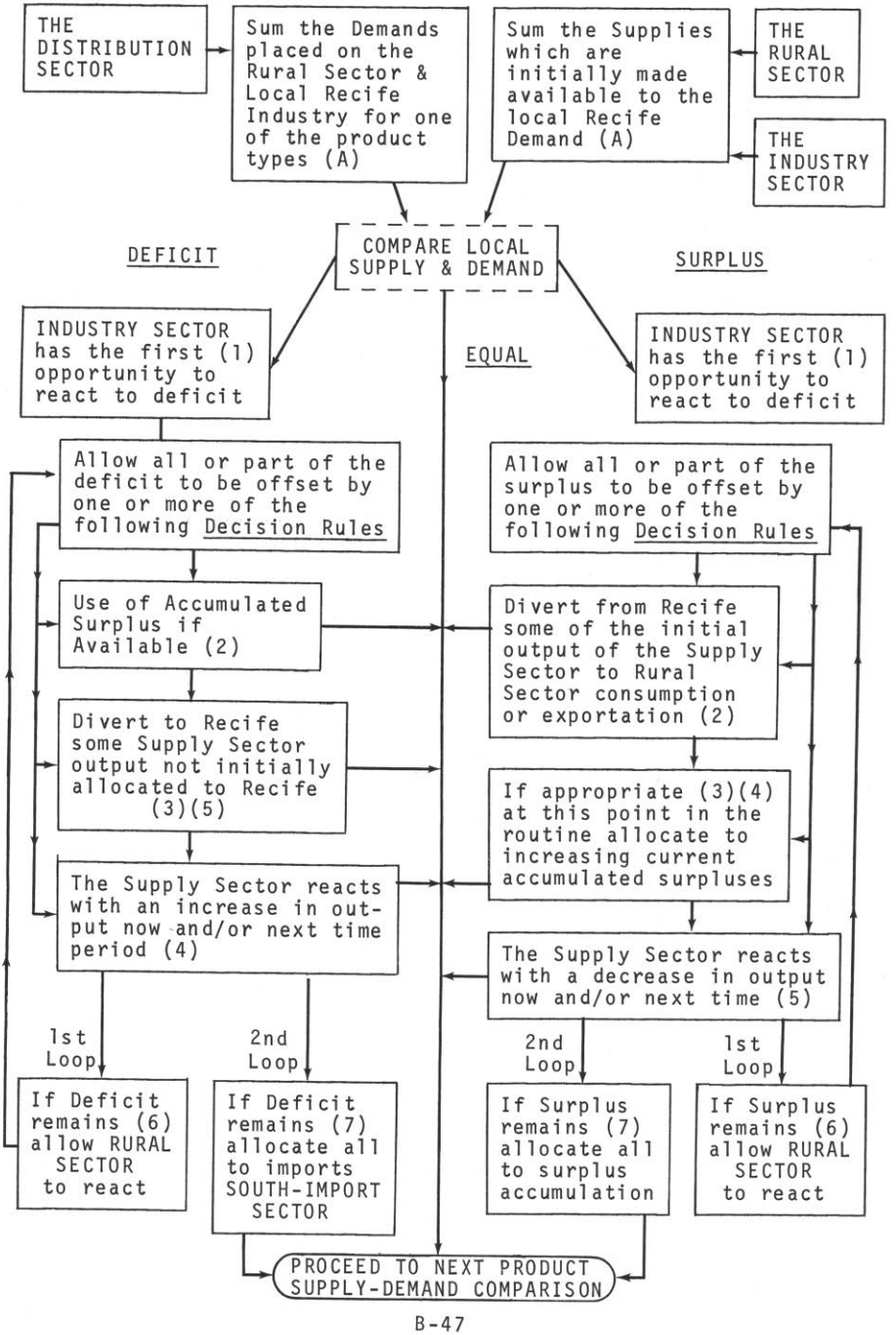
The rational and the general structure of Consumer I are adequately described in Chapter 11. The exact "flow chart" for the computer program of the routine is not incorporated in this appendix, but is available in the workbook which accompanies the computer program. Figure B.8 outlines the flow of decision rules. It is followed by a listing of the sequence of the routine for deficit and surplus conditions. The letters and numbers in the boxes of Figure B.8 correspond to the sequence listing which follows the figure.

The Sequence of Decision Rules - In order to effectively use the decision routine, it is imperative to understand the specific sequence which takes place in the allocation of any surplus or deficit which might exist. The following is a verbal explanation of that sequence.

A. Sum the demands for local industry and the rural sector by product classification--processed foods and consumer goods. Non-processed food comes only from the rural sector, so no summation is needed. Sum the supply which the rural sector and local Recife industry sector have allocated to the Recife market by product classification. Again, non-processed food supply is not summed.

B. Compare the total supply from local sources with the total demand on the local sources. If they are equal, continue on to the next set of comparisons and allocations. If there is a potential deficit or surplus, continue. At any point in the decision routine

Figure B.8 The Decision Routine-Consumer I--
The Flow of Decisions



where the deficit is completely allocated, skip the remaining decision rules and go to the next product classification comparison. For non-processed food, go through the decision loop for a deficit or a surplus only once for the rural sector.

C. Against the given criteria, is the surplus or deficit too large to be realistic under present conditions in the economy? If so, stop computation, exit from computer, and state reason. Recompute supply and demand conditions and start the simulation run again.

A Deficit Condition

1. Given that a deficit exists, allow the local Recife industry supply sector to have the first chance to offset that deficit through the use of the following decision rules.
2. Given that there is currently some accumulated surplus for this classification of goods, can some proportion of that be made available at this time to offset the deficit? (If this is the second time through the "loop," can surplus be made available at this time?)
3. Given that a deficit still remains, is it appropriate at this point to attempt to divert sales of the supply sector to other regions back to Recife? If so, what proportion of the sales or output to the rural sector and to the south/export sector can be diverted to offset all or part of the potential deficit which exists between local supply and demand?
4. Given that a deficit still remains, can the supply sector react to that potential deficit by increasing output this time period and/or next time period?
5. Given that a deficit still remains, is it now appropriate to attempt to divert some (more) of the output allocated to other regions back to Recife? If so, what (added) proportion of the sales to the rural sector and the south/export sector can be diverted to Recife to offset the remaining local deficit?
6. If this is the first time through the "loop," then numbers 2 to 5 apply to local Recife industry. If there is any remaining deficit, allow the rural sector's economic units which produce this product classification to attempt to offset the remaining deficit. Thus, return to step number 2. If the rural sector has had the chance to offset the deficit and insufficient supply has been made available, continue.
7. Any remaining deficit is automatically assumed to be purchased from the south/import sector in order to meet the defined final demand for this product classification in the Recife area.
8. All deficit has been allocated; continue to the next comparison.

A Surplus Condition

1. Given that a surplus exists, allow the local Recife industry to have the first chance to offset that surplus through the use of the following decision rules.
2. By what maximum proportion can the supply sector's sales to the rural and south/export be augmented to alleviate all or part of the current potential surplus which exists?
3. Given that a surplus remains, is it now appropriate to allocate some portion of that remaining surplus to an accumulated surplus condition? (If any surplus remains after all decision rules have been used in Recife industry and the rural sector, it will go to surplus automatically.) If it is desirable to place some amount into temporary surplus at this time, what criteria for that placement will be used?
4. Will placement into surplus be a function of the remaining surplus or a function of the available storage facilities? In the first case, what proportion of the remaining surplus will be allocated to a surplus condition? In the latter case, what maximum proportion of total storage available can be used to handle the surplus?
5. Given that a surplus remains, can the supply sector react to that potential surplus by decreasing output this time period and/or next time period? If possible, by what proportion of total output?
6. If this is the first time through the "loop," then numbers 2 to 5 apply to local Recife industry. If there is still a remaining deficit, now allow the rural sector's economic units which produce this product classification to attempt to offset that amount remaining. Thus, return to step number 2. If the rural sector has had the chance to offset the remaining surplus and it was not able to offset the remainder, continue. Any remaining surplus is automatically assigned to an accumulated surplus condition with the following option. Of the excess supply, what proportion will be lost, damaged, spoiled, or destroyed and thus not be available for sale in some future time? All the rest will be assumed available for future use and assigned to an accumulated surplus account.
7. All surplus in local supply has been allocated; continue to the next product classification comparison.

The Decision Routine-Capital II - The Capital II routine is similar to the Consumer I routine, but is much simpler. It is oriented to the allocation of investment-related industrial output. The routine allocates the output of four industry types: construction materials, capital equipment, agricultural input equipment, and other industry output. The south/import-export sectors and inventory accounts act as buffers in the allocation of the differences in supply and demand for the output of the four industry types. In reality, the inventory account plays only a small role, since the region is such a large net importer of the product groups represented in the solution. But as capacity increases, it offers the ability

to analyze how well productive capacity is coordinated to effective demand for these investment-related goods.

Figure B.9 portrays the sequence of computation; it is followed by a verbal description of each step.

In allocating the output of the four industry types between the other Recife sector, the rural sector, and exportation, the following sequential assumptions are made for each output type:

1. The output of the four types is as determined and will not be altered by the routine. Any deficit in supply will be augmented from the south/import sector or from inventories generated in previous time periods by local industry.

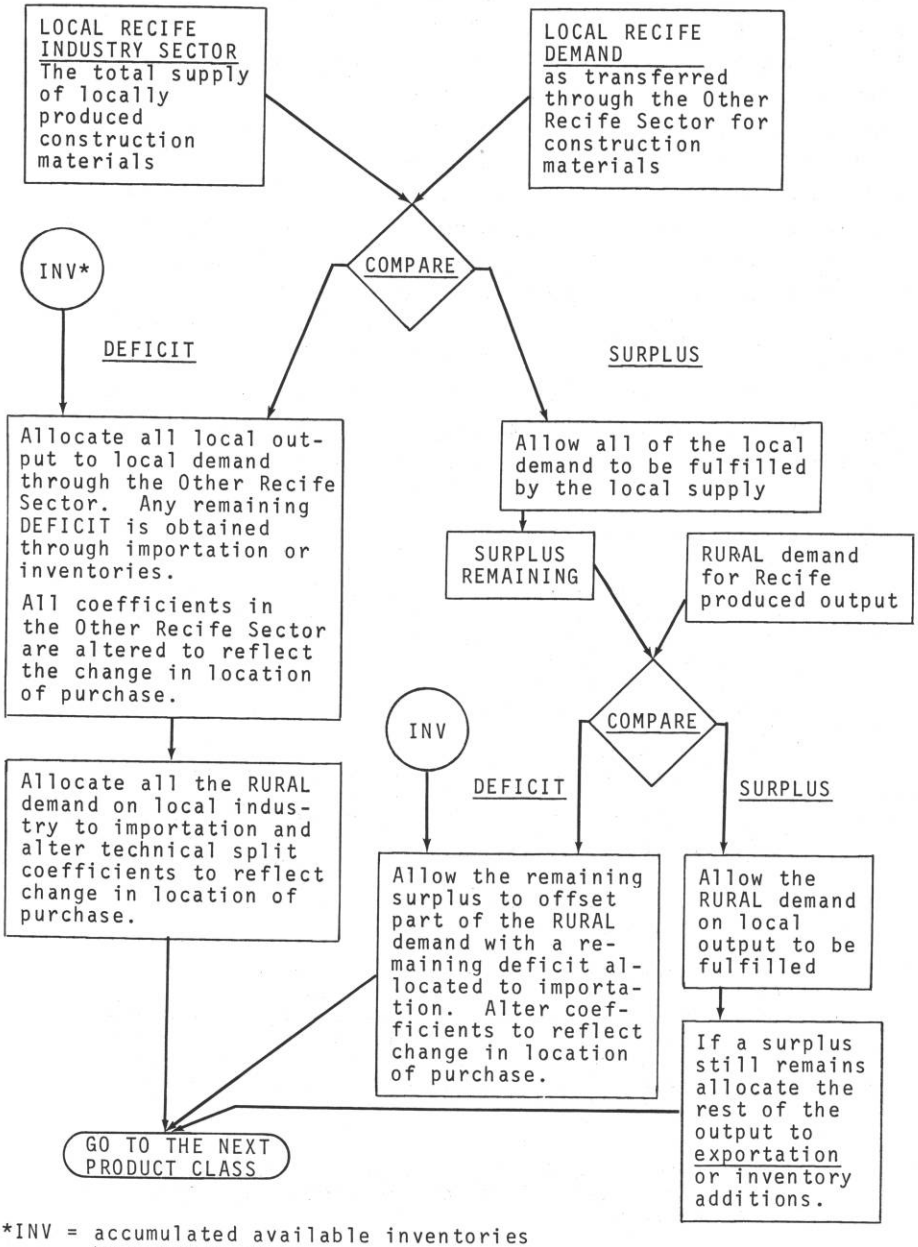
2. In the allocation of the output of the four types, a specific order of fulfilling demand is assumed.
   a. First, the demand from other Recife (local demand) will attempt to be filled; if the supply is not adequate for this demand, then all the remainder of the other Recife demand and all of the rural sector demand will be shifted to the south/import sector or accumulated inventories.
   b. If there is any supply left over after fulfilling the local demand, it will be made available to the rural sector. If the remaining supply is not sufficient for the demand of the rural sector, the remainder of the demand will be shifted to the south/import sector.
   c. If there is any excess supply after filling both of the above demands, the rest of the output supply will be assigned to the south/export sector or allocated to an accumulated inventory account.

Parameter Definitions, Sources, and Valuation

Chapter 13 demonstrates how the model is used and presents illustratively the results of three reform programs. The purpose of this section is to list the definitions, sources, and values of all parameter inputs for the base simulation and the three reform simulations.

In assessing the validity of the information used, it is important to understand that there are three very distinct levels of information accuracy presented in a set of simulations: first, information about the current system; second, information projecting the current system over the time period of the simulation (in this case five years); and third, information projecting the impact of the programmed reform options. Each information level is probably less accurate than the preceding one.

Figure B.9 The Decision Routine-Capital II--An Example of the Flow of Computations for the Local Recife Output of Construction Materials



*INV = accumulated available inventories by product class

The parameter values used in the simulations came from many sources and were developed during intensive workshop sessions with the research staff of the project. Generally, the information level was considered good for all the simulations, but on specific parameters reliability varied from very high to very low. There are about 1,200 input values which must be determined each time period, but these can be grouped into about 75 parameter definitions. For example, under the parameter "shopping propensities," 35 estimates are required (five consumer classes times seven distribution outlets). The job is simplified because many of the parameters will not be changed over time or when a reform program is implemented into the system. Thus, all parameters must be valued only for the current year of the base simulation. Some of these may be assumed to change over time in the base simulation; others may be assumed to change with reform implementation.

Information for this section was obtained from published materials, unpublished work, and research staff estimates. Instead of footnoting each reference, an abbreviated reference title (as listed below) is used in the source statements accompanied by page or table references.

1. Where no information was available, the most qualified research staff members (who had generally had responsibility in a research area) were the source of parameter data. Often this included experiences or information from other areas of South America (especially important in assessing reform program implications).

2. Unpublished research information and analysis. Much of the information developed from the research done in Recife is not published in this or any other document, but was used in determining parameter values. These included frequency charts, ACT analysis, and chi-square analysis of variables in particular surveys. The nature of the analysis, survey name, and variable numbers are included in the source statements.

3. Preliminary report of research. Some detailed information presented in the draft report of the research work done in Recife is deleted in the final draft, but was useful in developing parameter estimates for a number of inputs. This is especially true of the industry sector work done by Mark Doctoroff (termed "Draft Report" in the source statements).

4. Some of the data for specific parameters is included in this report. References are made by chapter, page or table.

5. Other specific references are:

   a. Robert W. Nason, "Urban Market Processes in Recife, Brazil," (unpublished Ph.D. thesis, Michigan State University, 1968). Termed "Nason Thesis."

   b. IBGE National Statistics Council, *Statistical Annuals of Brazil*, (Rio de Janeiro: National Statistics Council, 1964-1967). Termed "IBGE," years, pages.

   c. Getulio Vargas Foundation, *Projections of the Supply and Demand for Farm Products in Brazil*, (Rio de Janeiro: Getulio Vargas Foundation, Vols. I, II), 1966. Termed "GVF," page or table.

   d. Department of Defense, *Northeast Brazil Nutrition Survey*, March-May 1963, A Report for the Interdepartmental Committee on Nutrition for National Development, (Washington, D.C.: Department of Defense), May 1965. Termed "Nutrition Study," page or table.

This section is divided into two parts. The first names the parameter, states the source for the base simulation values, and lists the values of the parameter for the current year in the base simulation. The second part lists all additional changes in parameter values hypothesized for the three reform programs.

Each parameter is numbered and these numbers are cross-referenced in the verbal matrices of the equations presented earlier. After the name, in parentheses, are equation numbers which correspond to the verbal equation where the parameter is used. Also, following the equation numbers may be the letters "B," "M," "U," or "T." They signify that time-variant parameter changes are made in the base simulation, "B," in the modern discount supermarket reform, "M," in the total urban reform program, "U," and in the total urban and rural reform package, "T." If no such designation is stated, the parameter is assumed not to vary over time or with the implementation of any reform program.

In order to identify specific parameter values, it is important to know row and column definitions for the input matrices. Many of these are repeatedly used in identical order, so "common type definitions" are stated at the beginning of each set of parameter values for a sector. These "common type definitions," called CTDs, are applicable to rows and columns. For example, there are three CTDs for the consumption-income sector. In listing the input values for average shopping propensities, the table has seven rows and five columns. The columns represent income classes

(CTD-1) and the rows represent location of purchase (CTD-2). By looking at the listing under the "common type definitions" it is possible to identify the meaning of each entry in the table.

Parameter Inputs for the Consumption-Income Sector

Listed below are the "common type definitions" used in the consumption-income sector.

Common Type Definition-1 (CTD-1)

1. Very high income group
2. High income group
3. Middle income group
4. Low income group
5. Very low income group

Common Type Definition-2 (CTD-2)

1. Food expenditures
2. Non-food consumer goods expenditures
3. Other expenditures (including automobile transportation services, and housing rent payments)
4. Savings

Common Type Definition-3 (CTD-3)

1. Modern food outlets--food products
2. Modern food outlets--non-food products
3. Traditional food outlets--food products
4. Traditional food outlets--non-food products
5. Other food outlets (primarily restaurants)
6. Modern non-food merchandise outlets
7. Traditional non-food merchandise outlets

1. Total Consumer Income (3.01, 3.02), (B)

Definition: The rate at which the total consumer income is generated to each consumer type. This includes wages, distributed profits, transfers, and other income (in millions of U.S. dollars).

Source: Nason Thesis, page 68, gives the average per capita income. This, multiplied by the current population of 1.1 million, produces a total urban consumer income of US$330 million. This is split by income category using Table 2.2 of Nason Thesis with an assumed average family size of six (from MSU/SUDENE consumer surveys).

Base Simulation Values:

	Consumer Classes (CTD-1)				
Year	1	2	3	4	5
1	37.8	35.0	159.0	82.0	15.3
2	40.0	37.0	168.0	87.0	16.2
3	42.0	39.0	179.0	92.0	17.2
4	45.0	42.0	189.0	98.0	18.2
5	48.0	45.0	201.0	104.0	19.3

2. Effective Tax Rate (3.03)

Definition: The proportion of total income paid in all personal consumer taxes by consumer class. Effective rate vs "legal rate."

Source: Estimates are based on discussions with local officials in municipal and state government and from some businessmen in the urban area. It is assumed that the middle income class paid the largest effective rate, with higher and lower income groups paying a lower proportion of income in taxes.

Base Value:

Consumer Classes (CTD-1)				
1	2	3	4	5
.02	.06	.08	.06	.01

3. Average Propensity to Consume (General use in 3.1 and 3.2)

Definition: The proportion of disposable income spent on each of the four major types of expenditures or savings. Only the initial time period is input to the model, but it will change internally as incremental real income is generated from changing shopping behavior and price.

Source: Nason Thesis Table 2.2 modified to include the purchase of food in restaurants and bars. This food consumption is estimated to be higher in upper income classes (20%) than in the low income class (5%). The estimates are built on the basis of US$12 to 15 million in such sales.

Base Values:

		Consumer Types (CTD-1)				
		1	2	3	4	5
Type of expenditure (CTD-2)	1	.091	.149	.369	.596	.89
	2	.37	.35	.25	.2	.05
	3	.389	.401	.331	.204	.06
	4	.15	.1	.05	0	0

4. Average Propensity to Shop (General use in 3.1, 3.2) (B,M,U)

Definition: The proportion of food and consumer goods expenditures spent in each given type of outlet defined in the distribution sector.

Source: Nason Thesis, pages 88 and 193. Estimates for non-food expenditures made from survey on non-food retailers and selected questions in the MSU/SUDENE consumer survey (not reported). Base simulation changes over time estimated from Nason Thesis Chapter 3, Summary and Conclusions, Chapter 5, page 254, and in general Chapter 6.

Base Simulation Values:

Time Period 1

Types of distribution outlets (CTD-3)	Consumer Classes (CTD-1) 1	2	3	4	5
1	.3	.25	.15	.1	0
2	.03	.04	.05	.05	0
3	.5	.63	.75	.84	.95
4	.05	.11	.2	.45	.7
5	.2	.12	.1	.06	.05
6	.1	.08	.05	.02	0
7	.67	.72	.7	.48	.3

Changes in Base Values:

a. Expenditures in modern food outlets for food (Row 1)

Year	Consumer Classes (CTD-1) 1	2	3	4	5
1	.5	.63	.75	.84	0
2	.47	.615	.735	.84	0
3	.44	.6	.72	.84	0
4	.41	.585	.705	.84	0
5	.38	.57	.69	.84	0

b. Expenditures in traditional food outlets for food (Row 3)

Year	Consumer Classes (CTD-1) 1	2	3	4	5
1	.3	.25	.15	.1	.95
2	.33	.265	.165	.1	.95
3	.36	.28	.18	.1	.95
4	.39	.295	.195	.1	.95
5	.42	.31	.21	.1	.95

c. Expenditures in modern food outlets for consumer goods (Row 2)

Year	Consumer Classes (CTD-1) 1	2	3	4	5
1	.03	.04	.05	.05	0
2	.033	.042	.052	.05	0
3	.036	.044	.054	.05	0
4	.039	.046	.056	.05	0
5	.042	.048	.058	.05	0

d. Expenditures in traditional food outlets for consumer goods (Row 4)

Year	Consumer Classes (CTD-1) 1	2	3	4	5
1	.05	.11	.2	.45	.7
2	.047	.108	.198	.45	.7
3	.044	.106	.196	.45	.7
4	.041	.104	.194	.45	.7
5	.038	.102	.192	.45	.7

e. All others constant over time

5. Breakdown of Other Expenditures (3.13, 3.23)

Definition: The proportion of other expense spent on transportation, housing-rent, services, and miscellaneous.

Source: Nason Thesis Chapter 2, which contains estimates on the percent of households owning automobiles, and average rent and ownership payments. Other information built from unreported consumer survey results and interviews.

Base Values:

		Consumer Types (CTD-1)				
		1	2	3	4	5
Type of other expense	Auto-Trans.	.2	.3	.27	.2	.1
	Services	.4	.2	.15	.05	.05
	Rents	.3	.4	.45	.7	.8
	Misc.	.1	.1	.13	.05	.05

6. Proportion of Consumer Goods Expenditures Directly South-Import (3.15, 3.25)

Definition: That part of all consumer goods expenditures not spent in the Recife distribution sector but going directly to importation and final consumers. Must remain constant within a given simulation run.

Source: Estimate based on residual expenditures not accounted for in distribution sector (no direct data sources).

Base Values:

Consumer Types (CTD-1)				
1	2	3	4	5
.15	.05	0	0	0

7. Relative Price Index (3.1, 3.2) (B,M,U)

Definition: The level of relative prices between traditional and modern outlets using the traditional outlets as base. An input used to construct relative price matrices in 3.11-3.21.

Source: Nason Thesis Table 3.13 weighted according to consumption patterns for food products listed.

Base Values:

Type of Distributive Outlet (CTD-3)						
1	2	3	4	5	6	7
.92	.94	1.	1.	1.	.93	1.

Parameter Inputs for the Distribution Sector

Listed below are the "common type definitions" used in the distribution sector.

Common Type Definition-4 (CTD-4)

1. Modern food outlets--food
2. Modern food outlets--consumer goods
3. Street and public markets--food
4. Street and public markets--consumer goods
5. Small and neighborhood stores--food
6. Small and neighborhood stores--consumer goods
7. Other food outlets (primarily restaurants)
8. Modern non-food merchandise outlets
9. Traditional non-food merchandise outlets

Common Type Definition-5 (CTD-5)

1. Recife processed food industry
2. Recife consumer goods industry
3. Rural processed foods industry
4. Rural consumer goods industry
5. Rural agricultural food (non-processed)
6. South import sector--processed foods
7. South import sector--consumer goods
8. South import sector--non-processed food

8. Gross Margin (4.21) (B,M,U)

Definition: Sales minus the cost of goods divided by sales.

Source: Nason Thesis Chapter 3, Table 3.15.

Base Value:

Distribution/Product-Channel Types (CTD-4)								
1	2	3	4	5	6	7	8	9
.2	.31	.3	.38	.25	.34	.4	.38	.44

9. Rate of Spoilage (4.21, 4.22) (B,M,U)

Definition: Spoilage factor for each urban distribution product-channel for food and consumer goods. Each entry is one plus the percentage of spoilage as a proportion of total sales.

Source: Nason Thesis Table 3.14.

Base Value:

Distribution/Product-Channel Types (CTD-4)								
1	2	3	4	5	6	7	8	9
1.01	1.01	1.2	1.04	1.1	1.03	1.15	1.01	1.03

10. Technical Coefficient for Direct Labor (4.31)

Definition: Technical coefficient on direct labor. Per unit expenditure for direct labor as a proportion of goods throughput (goods throughput equals sales times 1 plus rate of spoilage).

Source: Nason Thesis Chapter 3, Table 3.4.

Base Value:

Distribution/Product-Channel Types (CTD-4)								
1	2	3	4	5	6	7	8	9
.025	.025	.015	.015	.025	.025	.15	.12	.14

11. Technical Coefficient Other Variable Costs (4.32)

Definition: Other variable costs as a proportion of goods throughput.

Source: Recife retailer surveys, frequency counts, variable numbers 448-457, wholesaler surveys same variables.

Base Value:

Distribution/Product-Channel Types (CTD-4)								
1	2	3	4	5	6	7	8	9
.06	.06	.12	.12	.08	.08	.15	.20	.18

12. Tax Rate (4.36)

Definition: The proportion of effective taxes paid to gross margin value.

Source: Retailer surveys, frequency counts, variable number 453 and wholesaler survey same variable.

Base Value:

Distribution/Product-Channel Types (CTD-4)								
1	2	3	4	5	6	7	8	9
.12	.12	.08	.08	.1	.1	.08	.12	.09

13. Fixed Charges (4.34)

Definition: Value of total fixed charges in given time period by channel type, input in millions of U.S. dollars.

Source: Due to lack of information, fixed cost estimates were included as other variable costs.

14. Proportional Breakdown of Net Profit (4.43)

Definition: This parameter allocates the value (after taxes) of net profit between distributed and undistributed net profits.

Base Value:

Net Profit Allocation:	Distribution/Product-Channel Types (CTD-4)								
	1	2	3	4	5	6	7	8	9
Distributed	.7	.7	1.	1.	.8	.8	.9	.6	.8
Undistributed	.3	.3	0	0	.12	.12	.10	.4	.20

15. Depreciation (4.35)

Definition: Total value of depreciation by channel outlet type input in millions of U.S. dollars.

Source: No estimate attempted, input "0" assuming investment allocation of residual net profits.

16. Source of Raw Materials Purchases (4.5) (B,M,U,T)

Definition: Source split matrix on the purchase of raw material inputs of food and consumer goods into distribution sector. Each entry is the proportion of a given raw material input purchased from a given source. There will be entries in this matrix only where rows and columns are of the same product type. For example, column 1, representing product-channel 1, can have entries in rows 1, 3, 5, 6, and 8 corresponding to food; but not in rows 2, 4, and 7, which correspond to consumer goods.

Source: Current year, Nason Thesis Chapter 3, Table 3.7 and Chapter 4, Table 4.4.

Base Value:

		Distribution/Product-Channel Types (CTD-4)								
		1	2	3	4	5	6	7	8	9
Location of Purchase (CTD-5)	1	.42	0	.16	0	.48	0	.35	0	0
	2	0	.7	0	.6	0	.6	0	.3	.5
	3	.03	0	.02	0	.02	0	.1	0	0
	4	0	.1	0	.1	0	.1	0	0	0
	5	.21	0	.72	0	.27	0	.35	0	0
	6	.25	0	.02	0	.1	0	.05	0	0
	7	0	.2	0	.3	0	.3	0	.7	.5
	8	.09	0	.08	0	.13	0	.15	0	0

17. Breakdown of Sales between the Two Types of Traditional Outlets (4.11)

Definition: Before calculations in the distribution sector can continue, the total value of traditional sales generated in the consumption sector for food and consumer goods must be split between sales in street and public markets and neighborhood stores. This split proportion defines the food and consumer goods sales in street and public markets as a proportion of total traditional food channel sales.

Source: Nason Thesis, Table 3.2.

Data Value:

For food sales .53
For consumer goods .55

Parameter Inputs for the Recife Industry Sector

The "common type definitions" for this sector are:

Common Type Definition-7 (CTD-7)

1. Agricultural farm inputs industry
2. Processed foods industry
3. Consumer goods industry
4. Other Recife industry (flexible)

5. Construction materials industry
6. Capital equipment industry
7. Supplier good industry (all intermediate sales)

Common Type Definition-7a (CTD-7a)

1. Agricultural inputs--rural sector
2. Agricultural inputs--south import sector
3. Non-agricultural inputs--rural sector
4. Non-agricultural inputs--south import sector
5. Facilitory inputs--industry sector supplier type
6. Facilitory inputs--other Recife sector
7. Facilitory inputs--rural sector
8. Facilitory inputs--south import sector
9. Other variable costs--other Recife sector
10. Other variable costs--rural sector

18. Initial Industry Output (5.11)

Definition: The initial output of all but the supplier goods industry type is given to the model at the beginning of each simulation run. The input is in millions of U.S. dollars.

Source: For processed food and consumer goods, output values were compiled from raw data information sheets of industry survey conducted by Mark Doctoroff, Table 5.d.1 in rough draft Recife Report, and estimates compiled from IBGE, 1966, pages 132, 117.

Data Value:

Agricultural inputs	6.3
Processed food	60.0
Consumer goods	75.0
Other industry	10.0
Construction materials	40.0
Capital equipment	15.0

19. Expected Annual Growth Rate in Industry Output (5.11)

Definition: This growth rate is input each time period for each of the industry types (except supplier goods) and is the expected increase over the last time period. This growth rate may be altered in the decision routines, depending on the type of decision rules employed.

Source: See Table 5.d.1 of Rough Draft Recife Report and raw industry data sheets of industry interviews conducted by Doctoroff.

Data Value:

5% for all six industry types. (This may be altered by the supply and demand conditions which develop internally in the model.)

20. Technical Coefficients of Inputs to Industry Sector (5.21)

Definition: For each of the seven "inputs" defined for the industry sector, technical coefficients related the value per unit input to the value per unit output.

Source: These technical coefficients are developed from the raw data sheets of the industry interviews and from Table 5.d.1 of the Rough Draft Recife Report.

Data Values:

	Industry Types (CTD-7)						
	1	2	3	4	5	6	7
Agricultural inputs	0	.36	.24	.3	.1	0	.03
Non-agricultural inputs	.48	.02	.09	.3	.5	.6	.38
Facilitory inputs	.11	.16	.07	.1	.1	.1	.03
Other variable costs	.04	.04	.03	.03	.03	.03	.03
Labor-intg.	.08	.07	.09	.1	.1	.1	.09
Labor-dist.	.01	.01	.01	.01	.01	.01	.01
Taxes	.15	.15	.15	.15	.15	.15	.15

21. Purchase Source of Inputs to Industry Sector (5.22)

Definition: The proportion of each raw material input which is purchased from a given sector source in the model.

Source: Table 5.d.1 of Rough Draft Recife Report and raw data industry sheets from industry survey.

Data Values:

		Industry Types (CTD-7)						
		1	2	3	4	5	6	7
Source of Purchase by Product Type (CTD-7a)	1	0	.7	.55	.5	.75	0	1.
	2	0	.3	.45	.5	.25	1.	0
	3	.25	0	0	.5	.1	0	0
	4	.75	1.	1.	.5	.9	1.	1.
	5	.2	.4	.3	.25	.25	.25	0
	6	.2	.1	.25	.25	.25	.25	.4
	7	0	.1	.15	.25	.25	.25	0
	8	.6	.4	.3	.25	.25	.25	.6
	9	.8	.5	.5	.5	.5	.5	.8
	10	.2	.5	.5	.5	.5	.5	.2

22. Tentative Distribution of Industrial Output of Processed Food and Consumer Goods (5.41)

Definition: Proportional split of output of these two types between local, rural, and export demand.

Source: Table 5.d.1 of Rough Draft Recife Report and raw data sheets of industry survey.

Data Values:

	Processed Food	Consumer Goods
Recife distribution sector	.452	.188
Rural sector	.411	.413
Export	.137	.399

23. Proportions Split on Net Profits (5.33)

Definition: Split net profits (after taxes) between distributed and undistributed components.

Source: Based on estimates developed by Doctoroff from industrial case studies. (no direct source)

Data Values:

		Industry Types (CTD-7)						
		1	2	3	4	5	6	7
Net Profit Allocation	Distributed	.5	.5	.5	.5	.5	.5	.5
	Undistributed	.5	.5	.5	.5	.5	.5	.5

Parameter Inputs for the Other Recife Sector

Listed below are the "common type definitions" used in the other Recife sector:

Common Type Definition-8 (CTD-8)

1. Automobiles and transportation
2. Services
3. Housing-rent
4. Other miscellaneous
5. Construction for industrial capacity (transfer)
6. Other construction (housing, apartments, schools, etc.) (transfer)
7. Capital equipment transfer demand
8. Minimal subsistence
9. Governmental revenues and allocations

Common Type Definition-9 (CTD-9)

1. Consumption sector automobile transportation expenditures
2. Consumption sector services expenditures
3. Consumption sector housing-rent payments
4. Consumption sector other expenses
5. Distribution sector variable cost
6. Distribution sector fixed cost
7. Industry sector variable cost
8. Industry sector fixed cost
9. Industry sector facilitory inputs
10. Investment sector investment demand for industrial and distributive capacity creating construction generated internally or from programmed change
11. Investment sector investment demand for other construction
12. Investment sector capital equipment demand generated internally
13. Minimal subsistence exogenously input
14. Consumption sector taxes
15. Distribution sector taxes
16. Industry sector taxes
17. Amount of total rent payments allocated to taxes
18. Net flow of government revenue from other areas of the country

Common Type Definition-10 (CTD-10)

1. Net profits from all units
2. Income generated--government
3. Income generated--from other consumer expenditures
4. Income generated--from construction
5. Income generated--from minimal subsistence
6. Net demand transfer from industry sector for construction materials
7. Net demand transfer from industry sector for capital equipment
8. Net demand transfer from industry sector for other industry type output
9. Net demand transfer from south import sector for construction materials
10. Net demand transfer from south import sector for capital equipment
11. Net demand transfer from south import sector for other industry type output

24. Allocation of Terminal Demand to each Type within the Other Recife Sector (6.11)

Definition: This is a receiver split matrix on terminal demand which allocates the 18 categories of terminal demand to the 9 function types defined in the other Recife sector.

Source: Most of the entries are non-variable direct allocations. Where splits had to be made on the terminal demand, they were estimated by the research staff.

Data Values:

Terminal Demands (CTD-9)	Units Defined in Other Recife Sector (CTD-8)								
	1	2	3	4	5	6	7	8	9
1	1	0	0	0	0	0	0	0	0
2	0	1	0	0	.	.	.	.	.
3	0	0	1	0	.	.	.	.	.
4	0	0	0	1	.	.	.	.	.
5	.4	.3	.2	.1	.	.	.	.	.
6	0	0	0	0	.	.	.	.	.
7	.2	.2	.4	.2	.	.	.	.	.
8	0	0	0	0	.	.	.	.	.
9	.5	.4	.1	.	0	.	.	.	.
10	0	0	0	.	1	0	.	.	.
11	.	.	.	.	0	1	0	.	.
12	.	.	.	.	.	0	1	0	.
13	.	.	.	.	.	.	0	1	0
14	.	.	.	.	.	.	.	0	1
15	.	.	.	.	.	.	.	.	1
16	.	.	.	.	.	.	.	.	1
17	.	.	.	.	.	.	.	.	1
18	0	0	0	0	0	0	0	0	1

25. Inter-function I/O matrix (6.12)

Definition: The parameters included in this matrix measure the degree of inter-unit transactions which take place between the nine economic units defined in this sector. Each I/O entry is the technical coefficient on the column unit's output which is demanded from the row unit.

Source: Very little information was available on these relationships. The estimates were made by the research staff.

Data Value:

		Units Defined in Sector (CTD-8) (these units sell to)								
		1	2	3	4	5	6	7	8	9
Units defined in Sector (CTD-8) (these units buy from)	1	0	.05	.05	.05	.15	.15	0	0	.1
	2	.05	0	.05	.05	.05	.05	0	0	.05
	3	.08	.1	.05	.05	.01	.01	0	0	0
	4	0	0	0	0	0	0			.05
	5	.05	0	0	.05	0	0	0	0	
	6	0	.05	.40	.05	0	0			
	7	0	0	0	.05	0	0	0	0	.1
	8	0	0	0	0	0	0			
	9	.1	.1	.1	.1	.05	.05	0	0	0

26. Source Split Matrix on the External Input Demand Transfers and Income by the Other Recife Sector (6.3)

Definition: This matrix of parameters determines the location of purchase of the externally demanded inputs of labor, material and equipment. Each column represents the proportional allocation of that unit's input demand.

Source: Again, no direct data source can be cited for this split on external demand. Best estimates were developed by the research staff.

Data Values:

		Units Defined in the Other Recife Sector (CTD-8)								
		1	2	3	4	5	6	7	8	9
Sources of purchase of external demands by product type	1	0	0	.2	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	.5
	3	.2	.7	.15	.6	0	0	0	0	0
	4	0	0	0	0	.2	.2	0	0	0
	5	0	0	0	0	0	0	0	1.	0
	6	0	0	0	0	.25	.25	0	0	.1
	7	0	0	0	0	0	0	.1	0	.1
	8	.1	0	0	0	0	0			
	9	0	0	0	0	.29	.29	0	0	0
	10	0	0	0	0	0	0	.9	0	0
	11	.42	0	0	0	0	0			

27. Minimal Subsistence Income (6.1)

Definition: Exogenously input value of wages which cannot be accounted for in the current system. This input is a balancing term for income sources in the system.

Source: For the initial time period in the model, this figure is derived from the difference between the expected level of income and the level of income actually generated by the explicitly included sectors in the model.

Data Value:

Time Period				
1	2	3	4	5
65	70	75	80	85

28. Net Tax Inflow (6.1)

Definition: The value of the net inflow of government revenues from all other regions in the country (primarily federal). Input in millions of U.S. dollars.

Source: Derived from estimates on the level of government wages generated in Recife area and the proportion which wages are to total revenue. (no direct data source)

Data Value:

Time Period				
1	2	3	4	5
50	55	60	65	70

29. Exogenously Input Investment Funds (6.1)

Definition: The value of exogenous investment funds applied to the purchase of labor, material, and equipment in the Recife area. This includes all investment internally generated in one of the other sectors except within the other Recife sector.

Source: These base estimates were generated from estimates of internally generated funds in the distribution and industry sectors and the commitment of "34/18" funds in the area. See Rough Draft Recife Report Chapter 5, Tables 5.c.3, 5.c.4, and 5.c.5.

Data Value:

Year	Construction	Equipment
1	30	25
2	32	25
3	34	27
4	36	28
5	38	29

Parameter Input for the Rural Sector

30. Modern Land Yields (7.11) (T)

Definition: Average yield for modern special types of producers. The value of ourput per hectare (in US$ 000)

Value per hectare = US$ exchange rate to NCr x NCr$ price per ton x tons produced per hectare (000)

Source: Not used in base simulation (see rural reform option).

31. Modern Land Area (7.11) (T)

Definition: Total land area to which modern yield applies. Input in thousands of hectares.

Source: Not used in base simulation (see rural reform option).

32. Traditional Land Yields (7.12)

Definition: Average yield for traditional special types of producers. The value of output per hectare (see #30).

Source: For rice, see Chapter 9 of this report, Table 9.22; for beans and cotton, see Table 8.2.

Data Value:

Beans $.075 = (.037 \times 3400 \times .6) \times 10^{-3}$

Rice $.114 = (.037 \times 1800 \times 1.7) \times 10^{-3}$

Cotton $.037 = (.037 \times 3000 \times .33) \times 10^{-3}$

33. Traditional Land Area (7.12) (B,T)

Definition: The total land area which applies to the traditional special types defined for reform analysis. Input in thousands of hectares.

Source: Final Report, Table 8.1.

Data Value:

Year	Beans	Rice	Cotton
2	486	76.5	860
3	510	80.5	870
4	535	84.5	880
5	560	88.5	890

34. Initial Rural Output (7.13)

Definition: Initial time period output of the rural sector; input in millions of U.S. dollars. All rural output is included in this sector except that defined in the special modern traditional types. This is input only in the initial time period.

Source: Based on IBGE, 1966, pages 101-108, 112, 113, 117, 132. The estimates generated from this source were increased by 5% and inflated to reflect the increased rate of exchange and divided by the base year rate of exchange. See also Final Report, Table 7.2.

Data Value:

1. Agricultural food output	200.0
2. Agricultural non-food output	28.6
3. Extractive industries	4.7
4. All other industry	238.0

35. Growth Rate in Rural Output (7.13)

Definition: The expected growth rate in output in the four major rural product types. Input in millions of U.S. dollars.

Source: Based on extrapolations of 1966 IBGE information; Final Report, Table 7.2; and *Projections of the Supply and Demand for Farm Production in Brazil*, Getulio Vargas Foundation Study, Vol. 1, 1966, pages 65, 75, and 93.

Data Value:

Estimated at 5% per year.

36. On-farm Consumption for Traditional Operators (7.15)

Definition: The proportion of total output of traditional special types considered on-farm use for both consumption and input.

Source: Estimated by rural staff compiled from Chapter 9, Tables 9.a.5 and 9.b.5.

Data Values:

Rice	.2
Beans	.15

37. On-farm Consumption for Other Rural Food Output (7.15)

Definition: Proportion of total food output which is considered on-farm use for both consumption and as an input factor.

Source: Estimated by rural staff from extrapolations of the information collected in the four-state area and project working memorandums.

Data Value:

.2

38. On-farm Rate of Spoilage for Modern Producers (7.18)

Definition: Spoilage as a proportion of total output value (only spoilage before first sale).

Source: Estimated by rural staff based on current traditional spoilage rate and project memoranda on some demonstration projects.

Data Value:

Rice	.01
Beans	.03
Cotton	.01

39. On-farm Rate of Spoilage among Traditional Producers (7.18)

Definition: (see #38 above)

Source: Chapter 9 Final Report.

Data Value:

Beans	.08
Rice	.04
Cotton	.02

40. On-farm Spoilage for Other Food Production (7.18)

Definition: (see #38 above)

Source: Estimated by rural staff using information from farmer survey and Getulio Vargas Study, page 65.

Data Value:

.06

41. Rate of Spoilage in Distribution for Food Products (7.23)

Definition: The proportion of total food available for sale assumed to spoil in rural distribution by location of sale.

Source: Chapters 8 and 9, Final Report; Getulio Vargas Study, page 65.

Data Value:

Local rural use	.12
Recife	.06
Export	.03

42. Allocation of Rural Food Output (7.20)

Definition: Proportional split of rural food output between Recife, the rural sector, and exportation.

Sources: Compiled by project staff from estimates of exportation, and channel maps in Chapter 9 of the Final Report.

Data Value:

Recife	.15
Rural	.73
Export	.12

43. Allocation of Other Rural Output (7.21)

Definition: Proportion of non-food agricultural output, extractive production, and other rural output which is exported.

Source: Estimated by rural staff from information in IBGE on exportation, the Hawaiian Agronomic Report, Statistics from Recife Port Authority, and Table 9B2 in Final Report.

Data Value:

.05
.5
.2

44. Base Year Non-farm Income (7.31)

Definition: Total value of income to rural non-farm consumers. Input in millions of U.S. dollars.

Source: Estimated by Webb, Larson and Harrison. Constructed from estimated per capita income in the towns of the four-state area times the estimates of population in those towns derived from IBGE and Pernambuco state statistics. Estimated current per capita income is $70 and population 2 million.

Data Value:

Time Period				
1	2	3	4	5
140	147	154	162	170

45. Total Farm Income (7.31)

Definition: Total value of income of rural farm consumers. This includes on-farm consumption valued at final prices. Input in millions of U.S. dollars.

Source: Derived from population and per capita income estimates and from Chapter 7 of the Final Report. Estimated current per capita income of $65 and population of 5 million.

Data Value:

Time Period				
1	2	3	4	5
325	338	352	366	380

46. Average Propensity to Consume--Non-farm Consumers (7.31)

Definition: Proportion of total income spent for food, consumer goods, miscellaneous (services, rents, taxes) and saving.

Source: Estimates derived from basis data in Chapter 8; farmer surveys; Getulio Vargas Study, pages 45 and 57; and U.S. Department of Defense nutritional study.

Data Value:

Food	.65
Consumer goods	.18
Miscellaneous	.15
Saving	.02

47. Average Propensity to Consume--Farm Consumers (7.31)

Definition: (see #46 above) This includes portion of food used on the farm.

Source: Farmer surveys; Getulio Vargas Study, pages 45, 47, and 57; and Northeast Brazil Nutrition Survey.

Data Value:

Food	.7
Consumer goods	.2
Miscellaneous	.09
Saving	.01

48. Rural Distribution Margins for Food (7.20)

Definition: Gross margin as a proportion of output available for sale to rural internal consumption, Recife and export.

Source: Chapter 9 Final Report modified by rural project staff. See respective channel maps in Chapter 9.

Data Value:

Rural internal	.07
Rural consumption	.15
Recife	.3
Export	.1

49. Technical Coefficients--Modern Operators (7.41)

Definition: Technical coefficients on all inputs of modern special types, measured in value input to value output.

Source: Technical coefficients on inputs for modern operators estimated by rural staff. Based on evidence of what a few modern operators in Bahia and other areas demonstrated in an extrapolation of Getulio Vargas Study results.

Data Value:

	Beans	Rice	Cotton
Labor	.5	.55	.5
Farm inputs	.1	.1	.1
Raw material--Food	.07	.07	.07
Raw material--Non-food	.03	0	.02
Other variable costs	.03	.03	.03
Residual investment expenses	.15	.12	.15
Residual profits	.12	.13	.13

50. Technical Coefficients--Traditional Operators (7.41)

Definition: Technical coefficients on all inputs for traditional special types. Input as value of input to value of output.

Source: Technical coefficients on inputs for traditional farmers, see Chapter 8 of Final Report.

Data Value:

	Beans	Rice	Cotton
Labor	.8	.85	.8
Farm inputs	.05	.02	.05
Raw material--Food	.03	.05	0
Raw material--Non-food	0	0	.03
Other variable costs	.03	.01	.03
Residual investment expenses	.04	.02	.04
Residual profits	.05	.05	.05

51. Technical Coefficients on Inputs for the Other Four Rural Categories of Output (7.41)

Definition: Technical coefficients on all inputs for the four major categories of rural output. Input as value of input per unit value of output.

Source: Estimated by Webb, Larson and Harrison based on data from IBGE, rural surveys, and industry survey; U.S. Department of Defense nutritional

study; Getulio Vargas Study, page 82; staff memos and labor information in farmer surveys.

Data Value:

	Other Food	Non-Food Agriculture	Extractive	Other
Labor	.72	.72	.65	.15
Farm inputs	.05	.05	0	0
Raw material--Food	.03	0	0	.15
Raw material--Non-food	.03	.03	.1	.4
Other variable costs	.02	.05	.1	.15
Residual investment expenses	.05	.05	.05	.05
Residual profits	.1	.1	.1	.1

52. Source Split Matrix on Rural Factor Inputs (7.43)

Definition: Source split matrix on the total demand for inputs by the rural sector. Each entry is the proportion of a given input which comes from a given source.

Source: Estimated by project staff using IBGE data, project memoranda, and MSU/SUDENE rural surveys.

Data Value:

	Location		
	Recife	Rural (internal)	Import/Export
Labor	0	1	0
Farm inputs	.6	0	.4
Raw material--Food	0	.8	.2
Raw material--Non-food	.2	.4	.4
Other variable costs	.2	.7	.1
Investment-associated expenses	.15	.45	.4
Net profit allocation	.2	.55	.1

Hypothesized Parameter Changes with Reform Options

All estimates made in the previous section are utilized in the reform simulations except where specifically noted below. Of the parameters assumed to be time variant in the base simulation, shopping propensities and traditional land areas under production of beans, rice and cotton are further altered. Other time-variant changes are retained in the simulation of reform programs. Additional time-variant parameter changes are added to those assumed in the base simulation.

Modern Discount Supermarket Reform Program

a. Average Propensity to Shop (4)

Source: Again Chapters 3, 5, and 6 of the Nason Thesis present the justifications for these changes, especially the summary and conclusions of Chapter 3.

CHANGES IN SHOPPING PROPENSITIES

Modern Food Outlets for Food

Consumer Types (CTD-1)

Year	1	2	3	4	5
1	.3	.25	.15	.1	0
2	.375	.315	.21	.15	.05
3	.45	.38	.27	.2	.1
4	.525	.445	.33	.25	.15
5	.6	.51	.39	.3	.2

Traditional Food Outlets for Food

Consumer Types (CTD-1)

Year	1	2	3	4	5
1	.5	.63	.75	.84	.95
2	.425	.565	.69	.79	.9
3	.35	.5	.63	.74	.85
4	.275	.435	.57	.69	.8
5	.2	.37	.51	.64	.75

Modern Food Outlets for Consumer Goods

Consumer Types (CTD-1)

Year	1	2	3	4	5
1	.03	.04	.05	.05	0
2	.037	.047	.056	.055	.005
3	.044	.054	.062	.06	.01
4	.051	.061	.068	.065	.015
5	.058	.068	.074	.07	.02

Traditional Food Outlets for Consumer Goods

Consumer Types (CTD-1)

Year	1	2	3	4	5
1	.05	.11	.2	.45	.7
2	.043	.103	.194	.445	.695
3	.036	.096	.188	.44	.69
4	.029	.089	.182	.435	.685
5	.022	.082	.176	.43	.68

b. Relative Price Index (7)

Source: Chapter 3 section on summary and conclusions of the Nason Thesis.

CHANGES IN RELATIVE PRICE INDEX

Year	Type of Distributive Outlet (CTD-3) 1	2	3	4	5	6	7
1	.92	.94	1.	1.	1.	.93	1.
2	.917	.937	.995	.997	1.	.93	1.
3	.914	.934	.99	.994	1.	.93	1.
4	.911	.931	.985	.991	1.	.93	1.
5	.908	.928	.98	.988	1.	.93	1.

c. Gross Margin (8) and Rate of Spoilage (9)

Source: See Table 3.14 in Nason Thesis for some of the basic information used in estimating these changes.

Year	Modern Outlets (food sales) (1 - Margin)	Spoilage Rate
1	.8	.01
2	.803	.013
3	.806	.016
4	.809	.019
5	.812	.022

d. Location of Purchase of Food by Modern Outlets (16)

Year	Processed Food Recife Industry	South-Import Sector	Non-Processed Food Rural Sector
1	.42	.25	.21
2	.407	.237	.236
3	.394	.224	.262
4	.381	.211	.288
5	.368	.198	.314

e. Investment Expenditures (due to the implementation of the reform program) (29)

Expected level of investment expenditures associated with the implementation of this reform option with expected costs for four-year period (millions of U.S. dollars).

Year	
2	1.1
3	2.0
4	.5

Total Urban Reform Program

a. Average Propensity to Shop (4)

CHANGES IN SHOPPING PROPENSITIES

Modern Food Outlets for Food Consumer Types (CTD-1)

Year	1	2	3	4	5
1	.3	.25	.15	.1	0
2	.35	.29	.19	.125	.03
3	.4	.33	.23	.15	.06
4	.45	.37	.27	.175	.09
5	.5	.41	.31	.2	.12

Traditional Food Outlets for Food Consumer Types (CTD-1)

Year	1	2	3	4	5
1	.5	.63	.75	.84	.95
2	.45	.59	.71	.815	.92
3	.4	.55	.67	.79	.89
4	.35	.51	.63	.765	.86
5	.3	.47	.59	.74	.83

Modern Food Outlets for Consumer Goods Consumer Types (CTD-1)

Year	1	2	3	4	5
1	.03	.04	.05	.05	0
2	.035	.044	.054	.053	.003
3	.04	.048	.058	.056	.006
4	.045	.052	.062	.059	.009
5	.05	.056	.066	.062	.012

Traditional Food Outlets for Consumer Goods Consumer Types (CTD-1)

Year	1	2	3	4	5
1	.05	.11	.2	.45	.7
2	.045	.106	.196	.447	.697
3	.04	.102	.192	.444	.694
4	.035	.098	.188	.441	.691
5	.03	.094	.184	.438	.688

b. Rate of Spoilage (9)

CHANGES IN THE RATE OF SPOILAGE

	Type of Outlet					
	Modern		Traditional 1		Traditional 2	
Year	Food	C. Goods	Food	C. Goods	Food	C. Goods
1	1.01	1.01	1.2	1.04	1.1	1.03
2	1.013	1.01	1.175	1.04	1.09	1.03
3	1.016	1.01	1.15	1.04	1.08	1.03
4	1.019	1.01	1.125	1.04	1.07	1.03
5	1.022	1.01	1.1	1.04	1.06	1.03

c. Margin in Modern Food Outlets for Food (8)

Year	
1	.8
2	.803
3	.806
4	.809
5	.812

d. Relative Prices (7)

CHANGES IN THE RELATIVE PRICE INDICES

	Type of Outlet			
	Modern		Traditional	
Year	Food	C. Goods	Food	C. Goods
1	.92	.94	1.	1.
2	.915	.935	.987	.995
3	.91	.93	.974	.99
4	.905	.925	.961	.985
5	.9	.92	.948	.98

e. Location of Purchase of Food by Modern Outlets (16)

(SAME AS FOR MODERN DISCOUNT REFORM)

f. Location of Purchase of Food by Traditional Neighborhood Stores (16)

NON-PROCESSED FOOD

Year	Rural Sector	South-Import Sector
1	.27	.13
2	.283	.117
3	.296	.104
4	.309	.091
5	.322	.078

g. Investment Funds Committed to Reform Program (in millions of U.S. dollars)

Year	
1	2.1
2	3.75
3	.75
4	.1

The Total Urban and Rural Reform Program - This reform program includes all parameter changes incorporated for the total urban reform program and adds additional parameter changes in the rural sector. See the preceding section for an outline of the parameter changes in the urban sector. Below are only those parameter changes in addition to ones for the urban modern-traditional reform program.

a. Rate of increase in the output of farm inputs in the Recife industry sector is assumed to increase from 5% to 15% over the five-year period. (This, of course, is conditioned by the effects of Decision Routine-Capital II.)

b. Distribution Gross Margins (48)

Year	Margin on goods staying in rural area for internal final consumption	Margin on goods going to Recife
1	.15	.3
2	.15	.3
3	.15	.3
4	.14	.29
5	.13	.28

c. Modern Land Yields (30)

Source: The hypothesized increases in yield were estimated using demonstrated effect on some farms in the areas and referring to NO Easy Harvest by Millikan and Hapgood as well as Sugestoes para Adubação by Robert Cate. (See parameter definition 30 for method of calculation of yields.)

Modern Producers Yield Changes

Year	Product Type		
	Beans	Rice	Cotton
1	.105	.16	.056
2	.105	.16	.056
3	.12	.182	.056
4	.135	.205	.056
5	.142	.217	.056

d. Modern Land Area (31)
(in thousands of hectares)

Year	Product Type		
	Beans	Rice	Cotton
1	0	0	0
2	2.3	.64	10.
3	12.2	3.40	10.
4	38.4	10.60	10.
5	67.0	18.40	10.

e. Traditional Land Area (33)
(in thousands of hectares)

Traditional Land Area Changes

Year	Product Type		
	Beans	Rice	Cotton
1	464.0	73.0	852.
2	483.7	75.9	860.
3	497.8	77.1	870.
4	496.6	73.9	880.
5	493.0	70.1	890.

f. Investment Fund Committed for Reform Implementation (29)
(in millions of U.S. dollars)

Year	Urban	Rural	Total
1	2.10	.75	2.85
2	3.75	1.50	5.25
3	.75	2.00	2.75
4	.1	1.50	1.60
5	0	.55	.55