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AN EVALUATION OF SUDENE'S INDUSTRIALIZATION PROGRAM: THE CASE OF
PERNAMBUCO (BRAZIL), 1960-1975.

by

Jose Antonio Borello

A thesis
presented to the University of Ottawa
in partial fulfillment of the
requirements for the degree of
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UNIVERSITY OF OTTAWA

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PREFACE

When I started the research that would lead to this thesis I was determined to do a comprehensive evaluation of the industrialization effort promoted by SUDENE in Northeast Brazil from 1960 to the present. Very soon I realized such research lay outside my capabilities and means; it also became very clear that the more I found out about the topic, the more I realized how little I knew about the Northeast and its problems. In view of this, I decided that I would have to narrow the focus of my research. At the same time, such a restriction of focus reduced my ignorance to a more manageable size.

So instead of studying the promotion of industry in the whole of the Northeast, I chose one important state, the State of Pernambuco, as a case study; and instead of extending the analysis to the present, I decided, in view of the available data, to limit my thesis to the 1960-1975 period.

I believe that although, after the completion of this research, I remain a beginner student of the reality of the Northeast, my ignorance has changed: I am now an "enlightened ignorant"--I now know the extent of what I still have to learn, and to me that is enough to have made all the effort, all the pain, worthwhile.

ABSTRACT

In this thesis we identify, from an overview of the evaluation research literature, the main components of an evaluation procedure. Subsequently, we use this conceptual framework to evaluate SUDENE's program of industrial development. The evaluation is constrained in time to the 1960-75 period and in space to Pernambuco--one of the nine states that compose the Northeast, the region of influence of SUDENE, the agency for the development of the Northeast of Brazil.

The study attempts to answer the following evaluation question:

"Was SUDENE's industrialization program successful in inducing change in industrial employment, location, and structure in the State of Pernambuco?"

Success is defined in terms of a series of criteria. To each criterion of success corresponds a research hypothesis. These hypotheses operationalize the evaluation question by defining "immediate changes" in terms of: (a) an improvement in the performance of the industrial sector of Pernambuco vis-a-vis Brazil's, (b) a more even spatial distribution of industrial activity, (c) greater employment creation, and (d) a more diversified industrial structure; furthermore, the research hypotheses also address the problem of effectiveness of the program by looking into the question of actual as opposed to projected results.

The results of the evaluation can be summarized as follows. The general methodological framework adopted in this thesis proved to be very useful as a means of carrying out an evaluation study. SUDENE has tried in many of its reports to downplay its defeats and highlight its successes. Evaluations of SUDENE's industrialization program can be more successfully undertaken if the focus is one state and not the whole Northeastern region. Overall, the program was not successful for: (a) the decline of the industrial sector of Pernambuco continued after 1960, (b) the actual number of jobs created was only over half of the projected number of jobs, (c) the change in industrial structure took place at the expense of a sizable employment loss associated mostly to SUDENE's incentives, and (d) changes in the system of incentives in 1969 did not result in a dispersion of industry nor in greater employment creation.

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Chapter I

INTRODUCTION

1.1 SCOPE AND OBJECTIVES OF THIS THESIS

For twenty four years a myriad of researchers have taken to studying from several angles the regional development experience of the SUDENE in Northeastern Brazil. However, only a few of these studies have an evaluative component, and even fewer have focused solely on the industrialization promoted by SUDENE. Still, by no means is it difficult to find evaluations of this state-induced industrialization. Despite the number of studies, however, a review of these works has revealed two gaps which we aim to fill--even if only partially.¹

The first gap is methodological. Although evaluation research is a fairly new field, a large body of literature already exists. Nonetheless, none of the evaluations we have examined makes explicit use of this methodology. In this thesis we then identify, from an overview of the evaluation research literature, the main components of an evaluation procedure. Subsequently, we use this conceptual framework to evaluate the literature on SUDENE's program of industrial promotion and the program itself.

¹ The review included all the more accessible works on the subject although we are aware of the existence of other works which we have not been able to read, such as Buarque (1972), Heideman (1981), Janson (1974), Merlin (1976), Sandmeyer (1976), and Winterstein (1972) (see the last section of the bibliography).

The second gap we aim to fill is related more to the subject matter than to methodology. Here we address three issues: projected versus actual employment, the effect of policy and of policy changes on the location, factor mix, and structure of industrial projects, and the scope of evaluations.

Most of the evaluations of SUDENE's industrialization program have used projected employment figures. The gap between projected and actual figures is much too large to take projected figures as a proxy for real ones. A few studies have used actual figures either from samples or from more comprehensive surveys of the firms receiving incentives from SUDENE. However, these are studies directed and funded in most cases by the agency itself and not by independent researchers. This thesis presents actual employment figures from independent sources and compares them to figures from SUDENE.

A second point is the effect of policy changes on the location, and factor mix of SUDENE-supported industrial projects. That is, we evaluate SUDENE's program of industrial promotion not only from a rigid comparison of the objectives formulated at the outset of the program with the results obtained at the end, as has been customary in most of the literature, but we also take a more dynamic and flexible approach that takes into consideration policy changes occurring during the time under consideration.

Finally, this thesis is the first evaluation of SUDENE's program of industrial promotion that focusses on one state of the eight that form the Northeast--Pernambuco. Most of the previous evaluations have focused on either the Northeast region, the region divid-

ed in portions by grouping states, or the states themselves. This study, however, takes a more micro approach and looks at changes within the State of Pernambuco; this approach not only enables us to do a more in depth and detailed evaluation, but more importantly it allows us to evaluate the intra-state spatial impact of SUDENE's policies--something that has only been partially explored.

1.2 ORGANIZATION OF THIS THESIS

This thesis is divided in six chapters. The first chapter delineates the objectives and scope of the thesis and describes its organization. The second chapter provides background information on SUDENE specially as it relates to its industrial policies through an examination of the agency's development plans. This chapter also describes the 34/18-FINOR tax incentive scheme and other industrial incentives. The third chapter reviews the literature dealing with the evaluation of SUDENE's industrial promotion program, and emphasizes methodological considerations. The second part of this chapter presents the methodology and techniques to be used to evaluate SUDENE's program of industrial promotion. This part is structured around three components considered essential to undertake an evaluation. Chapter four describes and evaluates the data on industrial projects presented by SUDENE and other organizations. Chapter five tests the hypotheses presented in the second part of chapter three. Chapter five is divided in two sections. The first section looks at the performance of the industrial sector of Pernambuco versus Brazil and the Northeast during the period 1940-1975. The second section analyses the SUDENE-assisted projects from four general points of



view: expected/real employment, location, factor mix, and the overall changes brought to industrial structure. This section also looks at the effects of changes in the policies and incentives on the industrial projects induced by SUDENE. Chapter six is the last chapter and presents the conclusions and considerations for future research. The appendixes present the standardization of municipal boundaries through time, 1940-1980, a discussion on the industrial and demographic censuses, a description of the main data matrix, a list of firm names and name changes of the industrial projects approved by SUDENE in Pernambuco 1960-1982, a list of standard municipalities, and a list of acronyms.

Chapter II

SUDENE AND ITS POLICIES

2.1 THE NEED FOR THE AGENCY

SUDENE stands for Superintendencia do Desenvolvimento do Nordeste (Superintendency for the Development of the Northeast). Its sphere of jurisdiction is shown in map 1. The Superintendency was created by Law No. 3692 passed on December 15, 1959. Its role was and is to coordinate and supplement the activities of the different state governments and federal agencies acting in Northeastern Brazil. SUDENE has been involved in a wide range of activities. The agency has been involved in road building, electric power expansion, construction of water and sewerage systems, education, manpower training, agricultural development, improvement of food marketing, mapping and surveying, and industrialization. As for funding, at the time of its creation the agency was granted an annual revenue of two percent of federal funds.

The reasons for the creation of SUDENE are many and we will only mention them.² SUDENE's creation was the result of the political pressure exerted by different groups on the government of the day. These groups demanded an improvement in the desperate socio-

² Some of the studies which have looked at the reasons behind the creation of SUDENE are: Castro (1965:ch vi), Castro (1971: vol ii,6), Cohn (1976), Hirschman (1963:ch 3), Ianni (1971), Oliveira (1977:ch 6), Page (1972), Robock (1963).

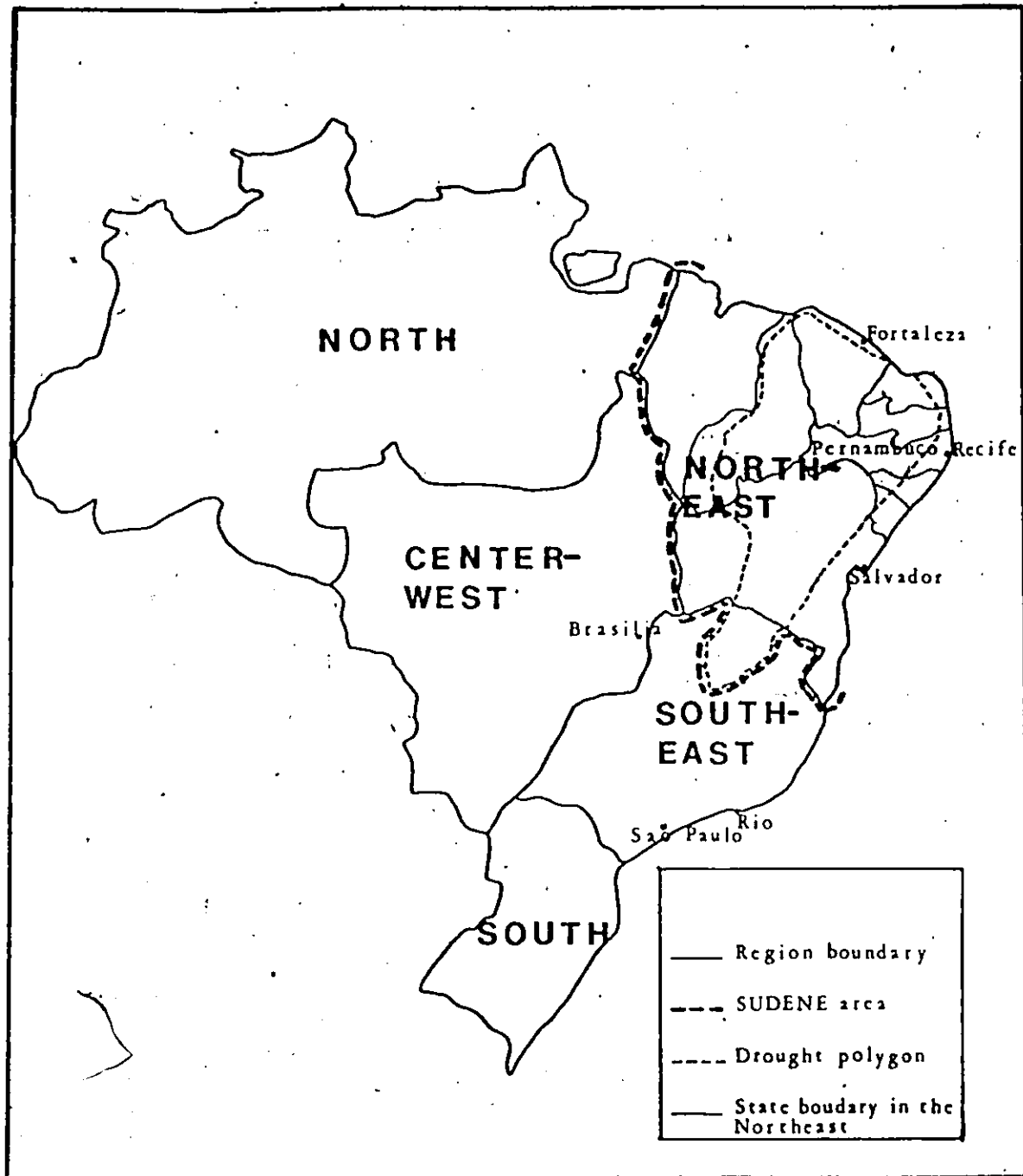


Figure 1: The Location of Pernambuco in Brazil, and the Area of Influence of SUDENE

economic condition of most of the (then) 25 million Northeasterners. The creation of SUDENE can also be viewed as a political initiative (much along the Alliance for Progress policies) to counter the so called revolutionary tendencies of several groups in the rural and urban areas of the Northeast (Moraes, 1970).³ Both the United States and the Brazilian government had noted with some foreboding the possible emergence of a Cuban type of revolution in the heart of the continent (Castro, 1965:ch 6; Robock, 1963; Hirschman, 1963). In addition, the Northeast was struck in 1958 by one of the most serious droughts the region had ever experienced.

SUDENE was also seen as the agency that would replace the old corrupt federal agencies dealing with the problems of the Northeast. Hirschman also argues that the presence of a Nordesteño, Celso Furtado, in the National Bank for Economic Development (BNDE) and the report Furtado drafted with the help of his associates on the situation in the Northeast were instrumental in the establishment of SUDENE.

2.2 PLANNING IN BRAZIL: REGIONAL OR NATIONAL?

SUDENE was the first regional planning agency created in Brazil. The creation of SUDENE marked a shift in the federal development policy of the Brazilian government. Before the establishment of SUDENE, federal development policies had been of sectoral rather than of spatial nature. Because incentives had no spatial restrictions they tended to favor the already developed regions of the

³ These labor movements did not stop after 1960 (see Hewitt, 1969; Palmeira, 1979; Sigaud, 1980).

country, thus strengthening the socio-economic and political position of Southern Brazil (Haddad, 1971; Dickenson, 1974). An example is the BNDE investment per capita by State between the Bank's foundation in 1952, and 1965. In this period the per capita share of the heartland states was more than 10 times that of the Northeast! (Dickenson, 1974:309)

A clear concern for the spatial implications of planning only emerged at the end of 1962 with the Plano Trienal 1963-1965. The plan was abandoned as a result of the 1964 revolution. The new government in its Plano de Acao Economica do Governo 1964-1966 (PAEG) was mainly concerned with "countering the country's structural and inflationary problems." (Dickenson, 1974:305). Nevertheless, in both the PAEG and the following Plano Estrategico de Desenvolvimento 1968-1970 (PED) there appears to be a greater awareness of the regional imbalances (Dickenson, 1974:305; Haddad, 1971:82).

The 1970's showed a decline in the influence of SUDENE and a growing concern by the federal government for national integration and the compatibility of regional and national objectives (Goodman, 1976:8). In essence, the federal government's diagnostic was that since regional agencies had been given their time and no impressive results had emerged, regional development was now to be directed from Brasilia. The new direction in regional development strategies was supported by the belief that attempting to counter the regional imbalances was not desirable in terms of economic efficiency.

2.3 THE NEED FOR INDUSTRIALIZATION IN THE NORTHEAST

The question "why is the Northeast an underdeveloped region?" has been answered in three general ways.⁴ The traditional answer was usually tied to some determinism: race, physical conditions, education, high population growth, drought, etc. The structural answer had to do with inter-regional inequalities, structure of the economy, unfavorable exchange rates, discriminatory taxation, etc. More recently, a new view has emerged that stresses the importance of class, and class interests, a view we may call alternative. The policies of the State in the Northeast have reflected these differences in thinking since solutions to problems are shaped by the way in which they are understood.

Since the Portuguese landed on the coast of the Northeast the State has responded to the problems of the region through two types of policies: mobilization policies and defensive policies. Mobilization policies are those policies that avoid a direct confrontation with the problem. For example, in years of drought the population of the Sertao moved to the more humid coastal areas just as the Indians had done, before.⁵ Defensive policies are the opposite; they aim at taking the resources to the people. For example the construction of dams in the Sertao. Mobilization policies can also be divided in temporary, permanent and semipermanent. For example to leave the Sertao in drought years was a temporary mobilization poli-

⁴ A similar discussion, although in a different context, can be found in Lodder (1979:11).

⁵ Sertao is the semiarid interior of the Northeast. The word means literally the backlands.

cy whereas the State-induced colonization of the Amazon and the Maranhao by Northeasterners was a permanent or semi-permanent mobilization policy.⁶ The construction of roads and railroads from the Sertao to the coast and the humid west provided incentives for the permanent, semi-permanent, or temporary mobilization of people. However, all these policies, whether mobilization or defensive policies, can be said to result from a traditional understanding of the reality of the Northeast. It is only with the creation of SUDENE in 1960 that State policies changed to reflect a different understanding of reality. This understanding was reflected in the Furtado Report.⁷

2.3.1 The GTDN or Furtado Report, 1959

The report became public in 1959 under the title Uma Politica de Desenvolvimento Economico para o Nordeste. (An Economic Development Policy for the Northeast). The report was drafted by the Grupo de Trabalho para o Desenvolvimento do Nordeste, GTDN (Working Group for the Development of the Northeast), a group of researchers headed by Celso Furtado. The report called for structural changes on all fronts of the economy of the Northeast.⁸ The report called for:

⁶ The State of Maranhao lies on the border of the dry Northeast and the humid Amazon.

⁷ Albeit before this report other writers had pointed to the need to promote industrialization in the Northeast (see Lebreton, 1955; Singer, 1953).

⁸ Quotations from the Furtado Report are from a 1977 collection of essays on Brazilian industrialization (Versiani and Barros, 1977). Reprinted from a 1967 SUDENE edition. The original report was published in 1959.

1. intensification of industrial investments, aiming to create in the Northeast an autonomous manufacturing center;
2. transformation of the agricultural economy of the humid coastal area, in order to provide an adequate supply of food to the urban centers, whose industrialization should be intensified;
3. progressive transformation of the economy of the semiarid areas in order to increase their productivity and make them more resistant to the impact of the drought; and
4. displacement of the agricultural frontier of the Northeast aiming at incorporating to the economy of the region the humid lands of the Maranhao hinterland, which are in condition to receive the population surplus created by the re-organization of the economy of the semi-arid zone. (GTDN, 1959:297)¹⁰

The report concluded by saying:

The central objective of this Plan of Action {Plano de Acao} is, departing from a clear diagnostic of the Northeastern economic problem, to try to modify the course of events by the simultaneous attack on a series of fronts considered vital (GTDN, 1959:337).

The two goals around which the Plan of Action concentrated were the reorganization of the economy of the Sertao and the increase of the average productivity of the labor force in the humid zone. The latter goal, pointed the GTDN, "demanded, necessarily, intensification of industrial investments....{and}....should materialize in a short term...." (GTDN, 1959:337). Because "....development is only possible through....industrialization....the analysis of the present

⁹ It has to be clear that the nature of the changes proposed was structural with no clear "leftist tendencies", as some misinformed writers tend to believe. Sutherland, for example refers to Furtado as "the left-wing economist" (Sutherland 1967:187 note 4).

¹⁰ Translations of foreign-language passages are my own unless otherwise stated.

economic situation of the region indicates clearly that its relative backwardness will be surmounted only through an industrialization policy....The industrialization policy aims at the triple objective of providing employment....creating a new ruling class....and fixing in the region the capital emanating from other economic activities, which now tends to migrate." (GTDN, 1959:296; emphasis added)

The overall success of SUDENE as a planning agency depended on its ability to carry out simultaneously programs of a complementary nature. Thus, SUDENE was to attack the employment problem from two fronts: the promotion of industrialization in urban areas, and the creation of employment in rural areas through both intensification of production and extension of the agricultural frontier. However, "political and budgetary constraints",¹¹ allowed industrialization to become the solution to the employment of the whole region (Morieira, 1978:63).

SUDENE's First Master Plan (IPD, 1961-1963) for the Northeast follows the Furtado Report. Paraphrasing the Furtado Report the IPD suggested that the promotion of industrialization in the Northeast should be a key objective aimed at redressing the problems of the region;

the development of the region will depend basically, on investments that create employment out of the agricultural sector.

Only with the development of industry will it be possible to modify the economic structure of the Northeast, facilitating the transition to a less unequal distribution of income and a more dynamic internal economic system. (SUDENE, 1960:167)

¹¹ Goodman et al, 1975:205

The creation of the 34/18 tax credit mechanism then becomes simply the means by which SUDENE could begin promoting industrialization in the Northeast.

2.4 THE NEED FOR A TOOL OF INDUSTRIAL PROMOTION: THE 34/18 SCHEME

The 34/18 scheme is a tax credit mechanism introduced in 1961 to promote industrialization in the Northeast.¹² Its name derives from Article 34 of Decree No. 3995 (Dec 1961), and the amendments introduced by Article 18 of Decree No. 4329 (June 1963).¹³ Although originally designed to promote industrialization it was extended to agriculture and telecommunications in 1966. The mechanism permitted registered Brazilian corporations to save up to 50% of their income tax deductions by investing these funds in projects approved by SUDENE in the Northeast. (The scheme was extended in 1963 to foreign corporations). Initially, the funds were deposited in an account at the Bank of the Northeast of Brazil (BNB). In order to use these funds, firms had to combine them with their own funds (recursos propios) and invest them in projects approved by SUDENE. A characteristic of the system was that additional funds did not have to be provided necessarily by the same corporation. In addition the BNB

¹² With the creation of SUDENE other incentives were created. These incentives also changed through time. These incentives are: reduction or exemption of import duties, exemption and partial deduction of income taxes, BNB and BNDE financing or guaranties, state and municipal incentives, financing for small and medium industrial firms in the Northeast (see SUDENE 1978a).

¹³ The mechanism was similar to the one already in existence in Southern Italy and its introduction was a motion of the Federal Deputy Gileno de Carli who had visited Italy and seen the mechanism functioning (see Carli, 1971; Carvalho, 1979).

could also finance up to 50% of the required own funds. Between 1960 and 1980 SUDENE approved more than 2,500 industrial projects in the Northeast. Through these projects an estimated US\$14 billion dollars (1980) were invested, of which US\$5 billion was in the form of tax credits. The accumulated annual budgets of SUDENE between 1960 and 1978 amounted to 30,428,504 thousand cruzeiros (1978), whereas the accumulated tax credit funds for the same period amounted to 233,403,700 thousand cruzeiros (Redwood, 1982; SUDENE, 1980c). In 1979 the gross internal product of the region was on the order of US\$27.2 billion.

The system did not remain the same during the 1961-1975 period, but rather it changed as a result of pressures from different groups. With this brief review of the tax credit scheme we only aim to highlight the changes in priority that discriminated in favor of certain locations, products, and techniques of production.¹⁴

2.4.1 The First Period, 1960-1969(March)

Although the 34/18 scheme only became operative in 1963, starting in 1960 SUDENE provided credits and reduction of exemption duties to selected industries. From 1961 to 1965 a program for the upgrading of the textile industry was implemented. At this time programs for the upgrading of the leather and hides and vegetable oil industries were also implemented. These programs aimed essentially at the modernization of these sectors (see TELEPRESS, 1971;

¹⁴ For a more detailed discussion see: Antunes, 1967; Carvalho, 1979:ch 8; FGV EIAP, 1968; Goodman, 1972; Goodman and Albuquerque, 1974:149-210; Hirschman, 1968; Moreira, 1978; Souza, 1979:ch 10,12; and the SUDENE publications describing the system.

SUDENE, 1971). The projects approved under these programs during the 1960-63 period are included in our analysis.

The system only became operative in November 1963. That year a general set of criteria was outlined. The criteria considered as priority projects those that matched one or more of these objectives: (FGV EIAP, 1968; TELEPRESS, 1971)

1. establishment of basic growth inducing industries¹⁵
2. modernization, complementing, or expansion of existing industry, with an increase in productivity (rentabilidade)
3. import substitution of products from abroad or other regions of the country, as well as production of goods exportable to other regions of the country or abroad
4. use of agricultural and mineral raw materials produced in the Northeast
5. intensive labor absorption.

In December 1965 and June 1966 important modifications were introduced into the scheme. The amount of own funds to be provided by firms was calculated by SUDENE according to a system of points after they had met one or more of nine different criteria. The first five criteria were the same as in 1963; the remaining four were: (FGV EIAP, 1968; TELEPRESS, 1971)

1. localization in areas of poor industrial and agricultural development

¹⁵ Throughout the text growth inducing, modern, and dynamic are used interchangeably to refer to the same group of industries (see table 4 in chapter 5).

2. achievement of full incorporation of the regional agricultural sector to the process of national development
3. meeting the growing demand for basic food staples and basic raw materials considered essential for the development of the Northeast
4. contribute to a resolution of the inadequacies of the institutional framework in agriculture in the region.

The system of points classified projects in three categories: A, B, and C. Class A were projects that received 50 or more points and could receive up to 75% of the total projected investment in 34/18 funds. Class B were projects that received between 30 and 49 points and were entitled to up to 50% of the total investment to be covered from 34/18 funds. Class C were projects that received 29 or less points and could only be entitled to a maximum of 25% of the total investment to be covered by 34/18 funds. The system of points assigned points as follows: (FGV EIAP, 1968; Sutherland, 1967)

1. (25 POINTS) Telecommunication systems connecting two or more Northeastern communities.
2. (25 POINTS) Basic and growth inducing industries, defined as those aiming at the production of capital goods, durable consumer goods, and goods of general use in industry, agriculture or fishing.
3. (20 POINTS) Industries to produce basic food staples.
4. (10 POINTS) Pioneer activities, defined as production of non-traditional goods in a state, or location in a non-traditional area.

5. Location:

- a) (20 POINTS) States of Piaui and Maranhao.
 - b) (15 POINTS) States of Rio Grande do Norte and Sergipe.
 - c) (10 POINTS) Rest of the Northeast except Metropolitan Recife and Salvador.
 - d) (5 POINTS) Metropolitan Recife and Metropolitan Salvador.
6. (25 POINTS) Agricultural projects for the production of goods the demand for which is acknowledgedly unsatisfied or of basic foodstuffs the regional supply of which is not sufficient.
7. (10 POINTS) Special programs resulting from studies made or approved by SUDENE and defined as of high priority for the region.
8. (5 POINTS) For the increase of productivity through modernization of existing industries.
9. (5 POINTS) For input substitution projects (from out of the region or abroad).
10. (5 POINTS) For the production of exportable commodities.
11. (5 POINTS) For projects in which at least 50% of the cost of inputs represents materials produced in the Northeast.
12. (5 POINTS) For projects promoting intensive absorption of labor force (defined as those projects creating at least 300 jobs, and in which the share of salaries and other labor costs (encargos trabalhistas) is over 25% of the gross value added).

13. (5 POINTS) For projects using the maximum possible of national components.

2.4.2 The Second Period, 1969(April)-1974

In 1969 new changes were introduced in the 34/18 scheme. These changes reflected the growing criticism of the media and influential groups in Brazil, and SUDENE's own concern, as to the effectiveness of the agency in promoting a desirable type of industrialization.

TABLE 1

Comparison of the 34/18 Project Classification Systems of 1966 and 1969

Class	June 1966	% own funds	March 1969	Class
	Points		Points	
Class A	50 or more	25%	50 or more	Class A
		40%	40 to 49	Class B
Class B	30 to 49	50%	30 to 39	Class C
		60%	25 to 29	Class D
		70%	24 or less	Class E
Class C	29 or less	75%		

Source: SUDENE, 1981a; FGV EIA, 1968; Sutherland, 1967.

The point system was transformed to discriminate even more against location in the metropolitan areas of Recife and Salvador. The new system of points classified projects in five classes instead

of three as in the old system. As table 1 shows, the new classification made it even more favorable for investors. Thus, prior to March 1969, a firm with a project accumulating between 40 and 49 points had to provide 50% of the total investment from its own funds, after March 1969 only 40%; a firm with a project accumulating 29 points had to cover 75% of the total investment from its own funds; after March 1969 only 60% and so on. The new system assigned points as follows: (Moreira, 1978; SUDENE, 1978a, 1981a)

1. (25 POINTS) Electric power and telecommunication systems.
2. Location:
 - a) (25 POINTS) States of Maranhao and Piaui, and Federal Territory of Fernando de Noronha.
 - b) (20 POINTS) States of Rio Grande do Norte and Sergipe.
 - c) (15 POINTS) States of Ceara, Paraiba, and Alagoas, and portion of Minas Gerais within the SUDENE jurisdiction.
 - d) (10 POINTS) Portions of the States of Pernambuco and Bahia within the Drought Polygon, and area of Bahia west of the border line of the Polygon.
3. Product:
 - a) (20 POINTS) Capital goods and basic intermediate goods sectors.
 - b) (15 POINTS) Other intermediate goods industries.
 - c) (10 POINTS) Textile and durable consumer goods.
4. (10 POINTS) Projects aiming at the substitution of foreign imports or with at least 40% of foreseen production designated for foreign markets.

5. (15 POINTS) Projects having over 80% of total raw and intermediate materials purchased in the Northeast.
6. (10 POINTS) Projects having over 50% of total raw and intermediate materials purchased in the Northeast.
7. (5 POINTS) Projects in which the share of labor in total value added is at least 25%.
8. (5 POINTS) Projects for relocation and/or modernization of existing plants to increase productivity.
9. (5 POINTS) Projects having employee profit-sharing provisions.
10. (5 POINTS) Projects with diversified equity ownership (empresas de capital aberto).
11. (25 POINTS MAXIMUM) Projects which favor intensive manual labor absorption considering: (a) number of direct jobs created and (b) total investment divided by the highest minimum monthly wage in the country, observing that the calculation of classification points, in each case, according to the formula: $(1250 / D_s) + 0.025 E$; where, D_s is the number of times in which the highest minimum monthly wage in the country is included in the total investment divided by the number of direct jobs created; E is the number of jobs created.
12. Considering other aspects especially the goods to be produced, advantages and disadvantages of location, and the availability of funds, SUDENE may add up to 10 points or subtract up to 15 points from the total given to any project.

13. Without the loss of other priority criteria, SUDENE will grant priority level "B" at the maximum, to those projects located in Recife, Salvador and their respective adjacent towns, and their industrial districts.

TABLE 2

Points Assigned by the Location of Projects, 34/18 System 1966 and 1969

Location	June 1966	March 1969
Piaui, Maranhao	20	25 a
Rio Grande do Norte, Sergipe	15	20
Ceara, Paraiba, Alagoas, Minas	10	15
Pernambuco, Bahia except capitals	10	10
Metropolitan Salvador and Recife	5	0 b
In a pioneer area of a state	10	

Source: SUDENE, 1978a, 1981a; Sutherland, 1967.

Notes: a Including the Territory of Fernando de Noronha.
b Projects in these metropolitan areas receive at the most priority "B".

2.4.3 A Summary of the Main Changes in the 34/18 System

From this brief outline of the main characteristics and changes in the 34/18 system up to 1975 two general conclusions can be drawn. The first one is that with time the system became increasingly more favorable to investors; the second conclusion is that the system increasingly discriminated in favor of peripheral locations and labor

intensive projects.¹⁴

How did the system become increasingly more favorable to investors? It was extended to foreign firms in 1963. The maximum 34/18 funds a firm might use was extended from 50% in 1963, to 66% in 1965, and 75% in 1966. In addition, half of the remaining 25% could be financed by the BNB or the BNDE; in that case the firm would only cover 12.5% of the total investment with "own funds". Funds from the 34/18 system could also be used, after 1966, as working capital (capital variavel) of a firm; previously they could only be used for capital stock (inversao fixa). (Moreira, 1978: ch 7)

From an overview of both the First SUDENE Development Plan and the GTDN Report it is clear that SUDENE was concerned more with reducing inter-regional as opposed to intra-regional disparities. As a result, the 34/18 became operative as a sectoral policy instrument with no provisions for location. Only in 1966, and more clearly in 1969, the system was modified in an attempt to direct projects away from the two largest metropolitan areas of the region: Recife and Salvador (see tables 2 and 1).

For employment, the situation was different. From the beginning the creation of employment was identified as an important objective. However, it is only after 1969 that a firm creating a substantial number of jobs could receive preferential treatment. Thus, in 1963 the creation of employment was the last of five objectives towards which the establishment of a firm might contribute. In 1966, employment creation could receive up to 5 points. In 1969, a

¹⁴ This was the intent, on paper, of the system of incentives; the actual results will be analyzed in chapter 5.

project could receive up to 25 points for creating employment depending on the number of jobs created.

In 1970 important changes were introduced. A substantial portion of 34/18 funds was diverted from industrial projects to other areas of the economy in the Northeast and part of Amazonia. Thus, 50% of the 34/18 funds to be invested by SUDENE were appropriated by PIN and PROTERRA.¹⁷ Priority to use the remaining 50% was given to agricultural projects under SUDENE's direction (Moreira, 1978:159). On December 1974 the 34/18 system was replaced by FINOR. The role of FINOR was to function as a more efficient middle-man than the brokers who, until that moment, had linked investors and projects. The problem was aggravated by the 1970 changes in the allocation of funds that reduced even more the amount of 34/18 funds available for investment in industrial projects in the Northeast.

The 34/18-FINOR system was a tool to accomplish certain policy objectives. These together with other objectives were outlined by SUDENE in its Development Plans. The Plans also outlined the rationale behind these objectives, and the means to achieve them.

¹⁷ PIN: Plano de Integracao Nacional (Plan of National Integration).
PROTERRA: Programa de Redistribuicao de Terras (Program of Land Redistribution).

2.5 THE OBJECTIVES OF SUDENE'S INDUSTRIALIZATION POLICIES)

2.5.1 Primeiro Plano Diretor, 1961-1963 (IPD)

The First Master Plan (IPD) for the Northeast essentially recommended two sets of actions to improve the conditions in the Northeast : (SUDENE, 1960:14)

1. To improve infrastructural conditions so as to promote investment in the region.
2. To increase the land under cultivation by colonization of the Maranhao, and irrigation of the arid interior (Sertao).

The guidelines (eixos de acao) to be followed in order to promote industry were: provision of infrastructure, coordination of incentives to industry, creation of basic industries (iron and steel), improvement of traditional industry, use of local raw materials, restructuration of handicraft activities, and formation of labor (SUDENE, 1960:27). According to the IPD the promotion of industrialization was seen as a way to achieve the following objectives: (SUDENE, 1960:11,15,167)

1. reduction of unemployment
2. creation of employment out of the agricultural sector
3. modification of the economic structure
4. the raising of income levels
5. lessening of income disparities
6. creation of a more dynamic regional economy
7. creation of a more dynamic industrial class.

2.5.2 Segundo and Terceiro Planos Diretores, 1963-1965, 1966-1968
(IIPD IIIPD)

The IIPD for the Northeast presents no major policy changes. Only in the III and IV Master Plans we find a more marked shift of policy reflected in the allocation of expenditures shown in table 3. As we can see more is invested in social and community services and less in infrastructure. It is also during this period that the largest number of industrial projects are approved. For all the Northeast, between 1966 and 1968 40% of all the projects for the period 1960-1975 were approved.

Starting with the IIIPD SUDENE acknowledged that although the industrial sector is growing the end goals of the industrial strategy are not being attained:

it should be noted that the growth of the industrial sector has not absorbed satisfactorily the surplus labor resulting from natural population growth or the immigration of workers from the rural areas to the cities. The persistence of this situation is explained by the fact that industrialization is taking place with use of high capital technology. Industrial expansion in the Northeast will probably create a greater concentration of income. Consequently, the effects of such expansion on the enlargement of the internal regional market could be lessened. (SUDENE, 1966b:135)

As Albuquerque points out, despite the clear preoccupation of SUDENE with employment problems and a better distribution of income, no clear strategies are proposed to address these problems (Albuquerque, 1978:74).

SUDENE indirectly acknowledges undesired effects created by the system of incentives on the economy as a whole affirming that the agency will not support those investments that will result in the production of non-essential goods, installment of idle capacity, and

TABLE 3

Relative Share of Different Expenditures on the Budget of SUDENE's Development Plans for the Northeast

Programs	IPD 1961-63	IIPD 1963-65	IIIPD 1966-68	IVPD 1969-73	PDN 1972-74	IIPND 1972-79
Infras- tructure	60.9%	49.4%	37.4%	37.5%	28.9%	8.8%
Social Services	13.5%	22.0%	29.9%	23.3%	19.8%	41.7%
Natural Resources	7.9%	9.3%	7.8%	9.6%	1.7%	0.2%
Primary Activities	14.4%	14.1%	17.9%	20.5%	17.5%	9.8%
Colonization	1.9%	1.7%	1.6%	1.9%	28.5%	0.4%
Industry	1.4%	3.0%	5.4%	5.4%	3.3%	29.7%
Other Programs	--	0.5%	--	1.8%	0.3%	9.4%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Albuquerque, 1978:73

Note: IPD, Primeiro Plano Diretor.
 IIPD, Segundo Plano Diretor.
 IIIPD, Terceiro Plano Diretor.
 IVPD, Quarto Plano Diretor.
 PDN, Plano de Desenvolvimento do Nordeste.
 IIPND, Segundo Plano Nacional de Desenvolvimento.

Funds from the 34/18 system are not included. For an idea of magnitude of the SUDENE budget vis-a-vis the 34/18 system see section 2.4.

disproportionate pressure on the country's balance of payments (SUDENE, 1966b:120). In this plan, there is, for the first time, a concern for the spatial implications of the promotion of industry (SUDENE, 1966b:140).

2.5.3 Quarto Plano Diretor, 1969-1973 (IVPD) and the Change in Policy for the Northeast

This plan shows a marked concern with social problems, though as in the IIIPD, no clear strategies are proposed to solve such problems. The Plan states that "economic development must also be accompanied by social development" (SUDENE, 1968c:18). The four major objectives of the plan are: high economic growth, lessening of inter-regional disparities, the improvement of the quality of life, and a more equitable distribution of income (SUDENE, 1968c:18).

In this plan there is also the revival of the old idea proposed by the GTDN and observed before by several writers including Preston James,¹⁸ that the main problem of the Northeast lies in the rural areas both of the Sertao and the Zona da Mata,¹⁹ and in their land tenure structure (SUDENE, 1968c:10).²⁰

In this plan the agency recognizes that industrialization per se will not solve the problems of the Northeast. Changes in rural areas must also take place. Unfortunately, agrarian reform was replaced by colonization of the humid areas of the Maranhao, and colonization itself resulted in failure. So much that it was dropped almost completely as we can see from the allocation of expenditures in the Second National Development Plan (IIPND). (See table 3).

¹⁸ James, 1953.

¹⁹ The Zona da Mata is a narrow humid strip along the coast of the Northeast used mainly for the cultivation of sugar cane.

²⁰ More recently the World Bank published a report whose main conclusion was that the only policy that would bring an improvement to the agricultural sector of the region and to those employed in it would indeed be land reform. (See Kutcher and Scandinazzo, 1978; also Hall, 1978:14)

Starting in 1968, industrial investments resulting from 34/18 started declining in the Northeast. A tide of criticism originated in political and managerial sectors of the Center-South as to the validity and soundness of SUDENE's industrialization policies. The criticism was based mainly on the argument that the industrialization of the Northeast meant an unnecessary and antieconomic diffusion of resources. Critics spoke of the necessity of greater rationalization and efficiency of the national system. The drought of 1970 showed once more the vulnerability of the economy of the Northeast after a decade of regional policies.

The drought was, without a doubt, the frame in which the federal government decided to change the orientation of its regional policies (Moreira, 1978:157-158). In 1971 the IVPD (1969-1973) is substituted by the Plano de Desenvolvimento do Nordeste (1972-1974 PDN). The PDN refers in many ways to the IPND (1972-1974). Regional policies are now subordinated to national ones. Also in 1971, PIN and PROTERRA are created. These two federal programs had part of their activities in the Northeast but were not subordinated to SUDENE even though as clearly specified in the IPD federal agencies acting in the Northeast had to be subordinated to SUDENE's authority (SUDENE, 1960:16).

2.6 SUMMARY

In this chapter we have briefly described SUDENE's industrial policies and industrial policy instruments during the 1960-1974 period through an examination of the Furtado Report, SUDENE's development plans and the regulations governing the 34/18 tax credit scheme of industrial promotion. Although SUDENE was and is involved in a number of activities, the promotion of industrialization became a paramount activity of the Agency throughout the 1960-1974¹³ period. The main tool of industrial promotion during this period was the 34/18 scheme. The scheme and the regulations governing its utilization changed markedly on March 1969 in response to criticism from within and from outside the Agency as reflected in the literature, press accounts, and SUDENE's development plans. The beginning of the 1970's also brought a curtailment on the autonomy of SUDENE. Still, the promotion of industry has continued until the present. What has this promotion meant to the Northeast? Was the promotion of industry beneficial for the Northeast? Is artificially promoted industrialization the or at least a solution to the underdevelopment of a region? These and other questions have lured many researchers to study, to analyze, and to evaluate the SUDENE experience. A review of some of these works forms the first part of next chapter.

Chapter III

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

3.1 AN EVALUATION OF THE EVALUATIONS OF SUDENE'S INDUSTRIALIZATION PROGRAM:

3.1.1 Evaluation and Regional Development

For decades, developing a region was synonymous with establishing industries. Thus, Russia provided China and Cuba with the necessary technical, managerial, and financial inputs to start their industrialization. Italy created the Cassa del Mezzogiorno, a regional development agency for Southern Italy with the main objective of promoting industrialization. Brazil created SUDENE and later SUDAM with the objective of promoting industrialization in the Northeast and Amazonia respectively.²¹ Today, it seems that as a regional development tool, among development thinkers, industrialization is not being seen anymore as the main road that will lead to development (See Streeten, 1980). Unfortunately, adequate evaluations of specific regional industrialization programs seem to be very rare. The same seems to be true in relation to other regional development policies, or to regional development policies in general. Despite decades of de-

²¹ In the developed world similar policies have been applied as shown by the experience of many European countries, the U.S. and Canada. (An overview of some of this literature is presented in Ansari, 1983. Furthermore, Ansari evaluates the Canadian attempts at promoting industrial growth in less developed areas of the country.)

velopment efforts we still do not know precisely why or how certain policies are more successful than others. That is, in many cases an adequate evaluation of their worth or validity has not been undertaken; this in spite of the fact that there is an impressive literature in the field of evaluation. However, as Hoole has rightfully pointed out, "The existing evaluation research literature has focused primarily on the American context and a separate statement for the development field is required." (Hoole, 1978:21)²²

This has also been noted by other writers. For example Nijkamp states that "[A] quantitative measurement of the effectiveness of regional policy instruments on regional development is still an underdeveloped field." (Nijkamp, 1982:2). Stohr and Todtling point out that "the actual effectiveness of these measures [regional development policies] to avoid major divergences between the private and social costs is still largely unknown." (Stohr and Todtling, 1977:86). Campbell points out that "many may feel...we already are continuing or discontinuing programs on the basis of assessed effectiveness...this is not at all so...most ameliorative programs end up with no interpretative evaluation." (Campbell, 1975:71). In the concluding chapter of one of the most comprehensive textbooks in the field of regional development, John Friedmann notes that "Despite the growing number of case studies of regional planning, we are still lacking a systematic evaluation of the effectiveness of imple-

²² Hoole (1978) is perhaps the first author to present a book-length work on evaluation and Third World development.

menting mechanisms for regional policies." (Friedmann, 1975:808)

In the case of SUDENE, in 1974 Albuquerque and Goodman reported, "...the lack of periodical and systematic evaluations of SUDENE's industrialization program, which has been in effect for the last ten years..." (Albuquerque and Goodman, 1974:377). Five years later, Souza affirmed: "A balance of the industrialization of the Northeast is opportune. The volume of funds invested in industrial projects...is so large...that, after more than 17 years, the need for a comprehensive technical evaluation of the system is fully justified." (Souza, 1979:298)

The thoughts expressed by these writers are a reflection of, among other things, the difficulties associated with undertaking evaluations of programs that cover an extensive area and affect large numbers of people; especially if these evaluations have to be done *ex post*. In this context Richardson says that "[none] of the different methods of evaluating regional policy ex post is entirely satisfactory." He concludes saying that "Policy evaluation remains a very crude science" due to data limitations and the opposition of policy makers to evaluation of their own performance (Richardson, 1978:30,32).

3.1.2 Introduction

In this section we will review those works that attempt to evaluate SUDENE's industrialization program. The review will be done in terms of the main components of a proper evaluation procedure.²³ The section is divided in three parts, each corresponding to an evaluation component (a more detailed discussion can be found in Borello, 1984).

The three main components of a proper evaluation procedure are: the evaluation question, the evaluation design, and the criteria of success. We formulate the evaluation question in terms of the type of information needed; the evaluation design is chosen according to the evaluation question (although here expense and data availability may have an influence); and finally, the criteria of success are related to both the evaluation question and the evaluation design. The quality and usefulness of an evaluation, or in other words its internal and external validity, depend not only on the evaluation components separately but also on the way in which they interrelate and complement each other.

Examples will be drawn from eight evaluations of SUDENE's industrialization program.²⁴

²³ The evaluation procedure presented is based mainly on the works of Suchman (1967), Campbell (1975), Patton (1978, 1981), Wildavsky (1979), and Caiden and Wildavsky (1980).

²⁴ Other works have been published on the subject. The interested reader may consult, Adamo, 1980; Albuquerque, 1978; Andrade, 1981; Antunes, 1967; Carvalho, 1979; Castro, 1971:ii,6; Goodman, 1976; Jatoba, 1975a; Koch-Weser, 1973; Konig, 1981; Lodder, 1979; Moreira, 1978; Oliveira, 1977; Ramos, 1970; Redwood, 1982; Souza, 1979; and Wasted, 1968.

3.1.3 The Evaluation Question

First we must have an evaluation question (Weiss, 1972:26; Patton, 1978:81). That is we must have a statement which we may consider as an independent variable, a stimulus, or a cause (Suchman, 1967:38-39). This hypothesis or relevant evaluation question does not have to be the objective(s) or goal(s) presented by the government agency. In essence, the evaluation question is a research hypothesis. It is a statement defining which parts of the program are to be evaluated and how the evaluation is to be conducted. The evaluation question is formulated in terms of what the evaluator wants to know about the program. Thus, for one particular program we may pose different evaluation questions.

Most of the evaluations of SUDENE's industrialization program present an evaluation question; however, most of these questions are either too vague, or too broad, or they cannot be answered empirically.

An adequate evaluation question is the one presented by Silva (1981): "to evaluate the performance of the Northeastern transforming industry, analysing the differential of employment growth rate and the installed output compared to the performance at national level." (Sic; from the English summary) Silva's statement of purpose is precise, of narrow scope, and it can be answered empirically.

On the other side of the spectrum, we find evaluations such as the one by Kleinpenning (1971): "The purpose of this article is to analyse and evaluate as far as possible at this stage, the

development policy applied up to now to this problem area."

(271) Kleinpenning attempted to narrow the scope of his article by saying that "we shall go mainly into the question of what has been achieved since 1959 in..." infrastructure, health, education, surveying, agriculture, colonization, and industrialization (276). The evaluation question is too broad. The author is trying to cover in a short article something that would entail at least a couple of volumes.

Another good example of how not to state an evaluation question is provided by Dickenson (1980). "This paper examines a series of strategies applied to the problem region of the Brazilian Northeast over the last 100 years." (57) Dickenson examines railways, dams, and manufacturing. Dickenson's evaluation question is too broad; answering it would require more than a short article.

Different evaluation questions may be formulated for the same program. Thus, for example, the researcher may be concerned with general effects of regional development policies (Kleinpenning, 1971; Dickenson, 1980), or he may be concerned with effects due to specific policy instruments (Hirschman, 1968; Goodman, 1972). The evaluation question may also be focused on establishing causal linkages between particular policies and effects. As do for example Goodman et al (1975), "The present work analyses the results of the fiscal incentive policy used to foster industrialization in the Northeast of Brazil and assesses its effects on the choice of technique" (201); "...it is inter-

esting to consider whether the observed capital intensity of new industrial projects in the Northeast is explained by the pronounced capital subsidy of the 34/18 scheme. Furthermore, can this characteristic be modified by policy-induced changes in relative factor prices? This question provides the main theme of the present paper." (208). The evaluation question is clearly defined and it may be answered empirically. Another evaluation which aims at establishing, and assessing the impact of particular program components on certain areas is the one undertaken by Ferreira et al, CAEN-SUDENE (1979). Here, the authors define the evaluation question as "This study tries to analyse and evaluate the effects of SUDENE's System of Fiscal and Financial Incentives as generators of direct and indirect employment." (p. 16). Subsequently the authors define and clarify the terms used in the evaluation question. Precise hypotheses are formulated.

3.1.4 The Evaluation Design

The second component of a proper evaluation procedure is choosing an evaluation design. By themselves designs are neither good nor bad. What is important is the relationship between the design and the evaluation question. A more technical consideration is the availability of data, time, and resources. Hence, choosing an adequate design entails a trade-off between the design we should use and the restrictions posed by the quality and quantity of data, and the resources and time available. (See for example Suchman, 1967:16,20).

There exists a whole range of evaluation designs. However, most of the evaluations we have reviewed showed an almost complete lack of awareness of the designs available. None of the eight evaluations reviewed uses any of the more powerful designs; nor do their authors explain why they did not choose a different design. Two of the works reviewed (Dickenson, 1980; Kleinpenning, 1971) employed after-only designs--the least powerful designs.

An example of a before-after design can be found in Hirschman's article (1968). "To appraise the quantity and quality of the industrial development stimulated in the Northeast by the tax credit mechanism, one has to compare investment now under way as a result of the scheme with the pre-existing industrial base." (13). The design used by Hirschman (1968) inhibits the determination of causation, at least quantitatively, which he acknowledges (15).

An example of an after-only design is provided by Dickenson (1980), "In examining strategies for regional development consideration must be given to the nature of the strategy, the distribution of the innovation of change, and the beneficiaries of change, if any." (57).

Other researchers have complemented their designs with information from other sources and thus, have increased the validity of their designs and hence of their evaluations. For instance, Silva (1981) used a before-after design comparing growth rates for industrial employment and industrial installed ca-

capacity in the Northeast for two different decades: 1950-1960 and 1960-1970. In turn Silva compared these rates to Brazil's rates on the same areas, and thus Silva had a sort of control group. Not a comparable group, but still he could use it as a yardstick or criterion of success. Other examples of combining different analytical tools to increase the validity of an evaluation are provided by Goodman (1972), and Albuquerque and Goodman (1974). Goodman uses a simple before-after design in conjunction with other complementary methods of analysis, such as input-output (for the analysis of industrial linkages), desagregation of data (in the analysis of the number of jobs resulting from 34/18), and personal interviews (in the analysis of the impact of factor costs, locational decisions, etc.). Albuquerque and Goodman use a before-after design, which they complement with data from other secondary sources and a field survey. (See methodological appendix, pp.377-397)

3.1.5 The Criteria of Success

The third component of a proper evaluation procedure is the establishment of proper criteria or indicators. That is, once the amount of change has been established, how does the evaluator determine if change has been positive or detrimental? If the evaluation question is well formulated, the criteria of success will be implicitly or explicitly stated in it. The problem of determining the criteria of success is analogous to defining confidence intervals.

Of the three evaluation components, this component is the one which receives the least attention. Of the eight evaluations reviewed, none defines clearly the criteria of success. This results to a great extent from the way in which SUDENE stated its objectives. As they are presented in SUDENE's plans, objectives are mostly of a qualitative nature. Quantitative goals appear only in the third and fourth Master Plans. This lack of definition in the objectives, as well as the lack of a set schedule of activities contribute to make very difficult any attempt at defining a clear and precise criterion or criteria of success.

Hirschman (1968), for example, concludes: "The preceding sections have shown that...34/18 has been turned into a highly effective and flexible policy instrument [on the grounds that] it is about to achieve a substantial expansion and diversification of the Northeastern industrial establishment." (18) Hirschman equates industrial growth and industrial diversification with success. Only four years later Goodman (1972) concluded that "The industrialization strategy is failing to eradicate precisely those critical problems which led to its adoption." (254) His conclusion is totally different from Hirschman's because his criteria of success were different. Neither Hirschman nor Goodman were wrong. Each writer simply adopted as criterion of success a different SUDENE objective.

For Dickenson (1980), as for Goodman (1972), success is related to the improvement of the socio-economic conditions

of the population of the Northeast. He states that "...the underlying philosophy ...[of this paper] is a humanitarian one which sees development as benefiting and improving the lot of the whole population." (58) For Hirschman, Goodman, and Dickenson the criteria of success were not defined quantitatively.

There is a need for adequate evaluations of regional development policies in general, and for what we have been able to infer from the review of evaluations of SUDENE, there is also a need to undertake an adequate evaluation of this regional industrialization program. Adequate evaluations will only result from the proper use of sound methodology. This methodology should be adapted to answer the evaluation question(s) posed; always bearing in mind that the essence of evaluation is analysis and criticism, and not merely description.

3.2 THE PROPOSED EVALUATION

The previous section has shown that although some evaluations of SUDENE's industrial promotion program have already been undertaken, only a few of them are methodologically sound. Moreover, none of the evaluations reviewed nor any of the ones of which we are aware has taken an in depth look at any of the central issues of our study: projected versus actual employment, and the effect of policy changes on the location and factor mix of SUDENE projects. In our study we also take a look at two themes which have already been treated in the literature: changes in the performance, and changes in the structure of industry. All these themes are examined at the

level of only one state of the eight that form the Northeast--the state of Pernambuco--something that has never been undertaken in a book-length form.

3.2.1 The Area of Study: The State of Pernambuco

The Northeast had in 1980 a population of 36 million, more than any of the Latin American countries except Mexico and the rest of Brazil (SUDENE, 1980a:24). Out of the nine States that compose the region, Pernambuco is second in terms of population (6.2 million in 1980; IBGE, 1981:3), after Bahia (9.5 million in 1980; SUDENE, 1980a:24). Pernambuco also contains the largest metropolitan area of the Northeast (Recife), and the state itself stretches across most of the different physiographic and economic environments to be found in the region. Furthermore, Pernambuco, together with Bahia, attracted more industry under the program of fiscal incentives than the rest of the Northeastern States combined. Thus, in the period 1960-1978 Pernambuco attracted 28.8 % of the total number of industrial projects in the region against 23.4 % for Bahia. In terms of investment and total number of jobs to be created, the figures for the same period were 21.7 % and 32.1 % for Pernambuco, and 43.8 % and 23.2 % for Bahia. As we can see, though Pernambuco had a smaller population than Bahia, the volume of direct employment created in Pernambuco was higher in absolute terms than for Bahia (SUDENE, 1980c:105; also Andrade, 1981:65). Another consideration was available literature, which is sizable for Pernambuco and Bahia but not for the other States of the Northeast.

And lastly, technical problems of data comparability were reduced because the State had in the latest census (1980) 164 Municipios, whereas Bahia, for example, had more than 300 for the same year.

3.2.2 The Evaluation Question and the Criteria of Success

As we pointed out in the introduction, methodology and subject matter are closely related. In other words, there is a rationale to focus in one area instead of another; and this rationale depends on the methodology used. Conversely, the methodology and the techniques of analysis used will depend on the subject matter. Finally, the subject matter and the methodology and techniques will be shaped by the resources at the disposal of the researcher.

This thesis uses a simple methodology built on three key components of an evaluation procedure: the evaluation question, the evaluation design, and the criteria of success. The evaluation question focuses the evaluation. The evaluation design provides the means to answer the evaluation question. And the criteria of success determine whether findings point to a success or failure of the program.

The promotion of industry by SUDENE was to achieve different objectives which we may divide in three groups: immediate, intermediate, and final. Final objectives were for example to improve the general well-being of the population of the Northeast. Intermediate objectives were for instance to transform the members of the industrial elite of the Northeast into modern industrial entrepreneurs. Immediate objectives are those strictly related to changes in the

industrial sector. It is then, from the examination of some of the immediate objectives and their attainment that we will evaluate SUDENE's policy of industrial promotion. Our evaluation question can then be phrased as:

Was SUDENE's industrialization program successful in inducing change in industrial employment, location, and structure in the State of Pernambuco?

The evaluation question needs further definition. Specifically, how do we define successful? That is, on what grounds are we going to decide whether the program was successful or not? What are our criteria of success?

3.2.2.1 Criteria of Success

SUDENE's industrialization program will be considered successful if the following conditions are met:

1. Performance of the Industrial Sector:

- a) If Pernambuco's industrial employment grew at least as fast as industrial employment in Brazil as a whole and faster than in the 1940-1960 period.

(The rationale being that the promotion of industry in Pernambuco should at least have stopped its relative decline vis-a-vis the Nation).

- b) If Pernambuco's industrial employment grew at a faster rate in 1960-1975 than in 1940-1960. (The rationale being that industrial promotion in Pernambuco during the 1960-1975 period should have resulted in faster industrial employment growth).

2. Expected-Real Employment: If the net (actual) employment created in SUDENE projects amounted to 80% or more of the projected employment (excluding non-functioning projects) during the period 1960-1975. (This is an arbitrary margin, but one we feel comfortable with for we are allowing for plant closures and problems in project implementation.)
3. Changes in the 34/18 System During the 1960-1975 Period:
 - a) Location: If firms receiving incentives from SUDENE (excluding non-functioning ones) tended to locate to a greater extent away from the Recife Metropolitan Area in the period 1969-1974 as compared to the period 1960-1969. (In March 1969 important changes were introduced in the 34/18 system).
 - b) Employment:
 - i) Capital/Employment ratio: If projects approved by SUDENE (excluding non-functioning ones) after March 1969 were less capital intensive than those approved between 1960 and March 1969 (In March 1969 important changes were introduced in the 34/18 system).
 - ii) Absolute Employment: If projects approved by SUDENE after March 1969 (excluding non-functioning ones) created more employment than those approved between 1960 and March 1969 (In March 1969 important changes were introduced in the 34/18 system).
4. Location: If firms receiving incentives from SUDENE locating outside of the Recife Metropolitan Area increased the share

of industrial activity of the non-metropolitan areas of Pernambuco during the period 1960-1975.

5. Structure:

- a) Modern Sectors: If SUDENE-assisted projects contributed to increase the absolute and relative share of modern industrial sectors in terms of industrial employment and thus contributed to diversify the industrial structure of Pernambuco during the period 1960-1975.
- b) Traditional Sectors: If SUDENE-assisted projects contributed to maintain the absolute share of traditional industrial sectors in terms of industrial employment during the period 1960-1975.

3.2.3 The Evaluation Design

Points "1" through "5" are the criteria of success we have adopted for this evaluation and they refer mainly to the immediate impacts of the program on the industrial sector of Pernambuco. Still, we need to re-define our evaluation question in terms of a series of research hypotheses. These hypotheses evolve from the evaluation question and the criteria of success. As we saw previously, the evaluation question addresses the immediate objectives of the SUDENE industrial policy.

It is indeed through the examination of both SUDENE's Development Plans and SUDENE's 34/18-FINOR policy instrument that we have identified three broad objectives. These objectives do not cover the whole spectrum of objectives the agency aimed to achieve. The

objectives we have isolated are immediate as opposed to long range, and only pertain to the industrial sector. These objectives are: an improvement in the performance of the industrial sector, a more even spatial distribution of industrial activity, and a more diversified industrial structure. Our evaluation will be carried out by testing whether these objectives have been attained. The objectives then become our main research hypotheses. To these three research hypotheses we have added two more. The first one looks into the problem of expected versus actual employment; the second takes into account changes in the application of the 34/18-FINOR system especially as it pertains to the location of industries and the creation of employment.

3.2.3.1 Hypotheses

1. Performance of the Industrial Sector:

- a) As a result of SUDENE's industrial policies industry grew faster in Pernambuco vis-a-vis Brazil during the period 1960-1975, than during the period 1940-1960. (We will test this hypothesis by comparing industrial growth in Pernambuco versus Brazil as a whole in both periods: 1940-1960 and 1960-1975).
- b) As a result of SUDENE's industrial policies industry grew faster in Pernambuco during the period 1960-1975 than during the period 1940-1960. (We will test this hypothesis by comparing industrial growth in Pernambuco in the periods 1940-1960 and 1960-1975).

2. Expected-Real Employment: The net employment created by SUDENE-supported projects matched projected employment figures during the period 1960-1975. (We will test this hypothesis by comparing projected SUDENE figures with figures from the Industrial Censuses, Industrial Cadastres, and other sources).
3. Changes in the 34/18 System During the Period 1960-1975: The changes in SUDENE's industrial policy were reflected in the location of industries and the creation of employment:
 - a) Location: The 1969 changes in the 34/18 scheme resulted in a greater number of projects locating outside of the Recife Metropolitan Area during the period 1969-1974 as opposed to the period 1960-1969. (We will test this hypothesis by comparing the location of projects before and after March 1969 in terms of number of projects, projected employment, projected total investment, and projected 34/18 investment).
 - i) Capital/Employment Ratio: The 1969 changes in the 34/18 scheme resulted in greater employment creation per unit of investment in the period 1969-1974 than in the period 1960-1969. (We will test this hypothesis by comparing the ratio investment/job before and after March 1969).
 - ii) Absolute Employment: The 1969 changes in the 34/18 scheme resulted in greater employment creation in the period 1969-1974 than in the period 1960-1969.

(We will test this hypothesis by comparing the absolute number of jobs created per period).

4. Location: Firms receiving incentives from SUDENE, by locating significant numbers of projects away from the Recife Metropolitan Area have increased the share of industrial activity of the non-metropolitan areas of Pernambuco during the period 1960-1975. (We will test this hypothesis by looking at the relative share of the Recife Metropolitan Area on industrial employment, value added, and salaries throughout the 1940-1975 period).
5. Structure:
 - a) Modern Sectors: SUDENE-assisted projects (excluding non-functioning ones) contributed to increase the absolute and relative share of modern industrial sectors in terms of industrial employment and thus contributed to diversify the industrial structure of Pernambuco during the period 1960-1975. (We will test this hypothesis in a number of ways by comparing the industrial structure of Pernambuco before and after SUDENE using shift-share analysis, diversification indexes, etc.).
 - b) Traditional Sectors: SUDENE-assisted projects contributed to maintain the absolute share of traditional industrial sectors in terms of industrial employment during the period 1960-1975. (We will test this hypothesis by taking an in depth look at employment changes in the textile sector of Pernambuco).

3.2.3.2 The Design Chosen and the Method of Triangulation

The design adopted in this study is a before-during design. That is, we will look at industrial change in Pernambuco before and during the establishment of SUDENE. In the absence of a control group, this design takes the changes occurring before as a yardstick against which we may measure changes occurring during. One of the techniques used in conjunction with this design is triangulation. In essence triangulation is the use of different data sources or different techniques of analysis to measure the same phenomena. The use of triangulation may enable researchers to have more confidence in their findings.

According to Denzin there are four basic types of triangulation: (1) data triangulation, (2) investigator triangulation, (3) theory triangulation, and (4) methodological triangulation (Denzin, 1978; in Patton, 1980:108). In this thesis we make use of data triangulation--"the use of a variety of data sources in a study", and of methodological triangulation--"the use of multiple methods to study a single problem or program." (Patton, 1980:108). We do not utilize investigator triangulation--"the use of several different researchers or evaluators", for obvious reasons; nor do we use theory triangulation--"the use of multiple perspectives to interpret a single set of data." (Patton, 1980:108-109)

For Denzin "no single method ever adequately solves the problem of rival causal factors....Because each method reveals different aspects of empirical reality, multiple methods of observation must be employed. This is termed triangulation." (Denzin, 1978:28; in Patton, 1980:109)

Patton is even more enthusiastic about triangulation, for him

Triangulation is ideal. It is also very expensive....Certainly, one important strategy for conducting evaluation research is to employ multiple strategies....where possible triangulation is to be highly recommended. (Patton, 1980:108-109)

Triangulation is a process by which the evaluator can guard against the accusation that a study's findings are simply an artifact of a single method, a single data source.... (Patton, 1980:332)

In this thesis we use data triangulation to determine the actual employment impact of SUDENE projects. Thus, we use industrial employment data from different sources: Industrial Censuses, Industrial Cadastres, SUDENE reports, Government of Pernambuco reports, and other sources, to test hypotheses two, three, and four.

3.2.3.3 Techniques of Analysis

Shift-share is a statistical technique of regional analysis which measures and identifies change occurring in a region between two time periods. Shift-share describes the nature of change in terms of two components: competition and mix. The first one refers to the region's share of growth vis-a-vis the nation when this growth results from cheaper (or more expensive) costs resulting from location, labor, inputs, or other factors. The mix component refers to growth due to the region's greater (or smaller) share of fast-growing industries in relation to the nation (Hoover, 1971:292-293). The literature on shift-share is extensive and there is no one particular formulation which expresses these components. Some authors add other com-

ponents to the two we have mentioned. We choose to adopt in this study the formulation proposed by Stillwell (1969). The author defines the major components of shift-share as National Growth, Industry Mix, and Differential Growth (our competitive component); thus, National Growth: $NG_{ij} = E_{ijo} (E_t/E_o) - E_{ijt}$

$$\text{Industry Mix: } IM_{ij} = [(E_{it}/E_{io}) - (E_t/E_o)] E_{ijo}$$

$$\text{Differential Growth: } DG_{ij} = E_{ijt} - [(E_{it}/E_{io}) E_{ijo}]$$

Where E is national employment in all industries in the base year; E is national employment in all industries in the terminal year; E is employment in industry i in region j in the base year; E is employment in industry i in all regions in the terminal year; E is employment in industry i in region j in the base year; E is employment in industry i in all regions in the base year; and E is employment in industry i in region j in the terminal year.

From these three major components of shift-share two more are calculated. One is Total Shift (TS); the other is Proportionality Modification Shift (PM). Thus, we have,

$$\text{Total Shift: } TS_{ij} = (IM_{ij} + DG_{ij}) = E_{ijt} - [(E_t/E_o) E_{ijo}]$$

Proportionality

$$\text{Modification Shift: } PM_{ij} = RP_{ij} - IM_{ij}$$

$$= [((E_o/E_t) - (E_{io}/E_{it})) E_{ijt}] - [((E_{it}/E_{io}) - (E_t/E_o)) E_{ijo}]$$

Total Shift adds the effects of Industry Mix and Differential Growth. Proportionality Modification Shift accounts for change resulting from the region having modified its industrial composition during the period under consideration.

Several objections have been raised against shift-share analysis.²⁵ Some of these objections are discussed in Richardson (1978), and in Ansari (1983). The technique is sensitive to the degree of industrial disaggregation; its theoretical content is controversial; differential shift and proportionality shift may not be independent; and the choice of base and terminal years may mask changes occurring between these extremes. However, as pointed out by Richardson (1978), controversy exists on these points and there is a "proliferation of research on the technique." Although Richardson concludes saying: "Is it not time to abandon this primitive standardization technique in favor of more reliable methods of regional analysis with more content?" (Richardson, 1978:20) he also says that "The safest type of application of shift-share is for historical and descriptive analysis..." (p.20); which is very much the use we are giving to the technique.

We will use shift-share to test the performance of the industrial sector of Pernambuco vis-a-vis the Nation (hypothesis one). We will also use shift-share to test whether the industrial sector of Pernambuco has diversified or not during the 1960-1975 period (hypothesis four).

²⁵ Richardson has even called it "a harmless passtime for small boys with pocket calculators" (Richardson, 1978:18).

Chapter IV

AN EVALUATION OF THE SOURCES OF INFORMATION

4.1 INTRODUCTION AND OVERVIEW

This thesis is essentially an empirical thesis. Hence it was decided that within the boundaries set by our own means and knowledge it was necessary to evaluate and modify the data we were going to use. This chapter, together with Appendix A, then tries to pull together the decisions and the compromises we had to make in order to organize data in a form that would allow us to test the hypothesis outlined in chapter III.

We make explicit what decisions and what compromises were made. We also evaluate the sources of data basing ourselves not only on our experience but also on the experience of other researchers. Evaluation is, after all an exercise based on gathering reliable information. This chapter and Appendix A also reflect on our own understanding of how the first step in evaluation should be carried out: by collecting data from different sources, by evaluating the validity and reliability of both the sources and the data, and lastly by modifying the data collected in a fashion that permits us to answer whatever question we may have posed about a program or policy.

We have chosen to use data for a period of 40 years because this would enable us to test whether SUDENE's program had an im-

pact on the industrial structure of the State, on the location of industries, and on the creation of employment. In this thesis we make use of most of the available secondary data sources to measure change in the industrial sector of Pernambuco. Our focus is mainly on employment. We use the Industrial Censuses of 1940-1975, the Industrial Cadastres of 1965 and 1975, several publications of the government of Pernambuco, almost all the published and some unpublished SUDENE data sources on industrial projects for the period 1960-1982, and the findings of most of the researchers interested on the subject and written in Portuguese, English, and Spanish.

4.2 SUDENE DATA

4.2.1 Overall Description and Evaluation

Perhaps the main weakness of the reports published by SUDENE and other agencies listing industrial projects approved by SUDENE is the lack of documentation on what was included and why, on what each variable means, that is, how it was defined, what the possible sources of error are and why. In essence what the reports lack is a couple of pages describing in detail the methodology used to collect the data.

The SUDENE data on industrial projects used in this thesis were compiled from just about all the publications listed in the most important bibliographical sources.²⁶ The publications were obtained from the SUDENE itself, and the libraries of: the University of Cal-

²⁶ See Camara de Deputados (1981), Jackson (1977), Library of Congress National Union Catalog, Lombardi (1974), CONDEPE (1973, 1976), SUDENE.Depto. de Administracao (1969).

ifornia at Berkeley, Harvard University, the University of Texas, the University of Florida (Gainesville), and the Library of Congress, Washington D.C.²⁷

Many of the earlier reports are of limited circulation because very few copies were made of them (see in the Bibliography those reports marked mimeo). The other reports are available for some years at some libraries, but we know of no single library in North America which has the complete collection of SUDENE reports on industrial projects approved by the Agency between 1960 and 1982.

A few general points can be made about the SUDENE data on industrial projects. The first one is that few of these publications can be taken at face value. That is, it would not be advisable to use data from these sources without first checking for problems as discussed below. Once these problems are understood, then, taken as a whole, the data presented in these publications are of acceptable quality. A second point is that the variables gathered are not always the same. For example, some reports only list the names of the firms setting up a project in Pernambuco but no location is given. While other reports may even list the address and telephone number of the plant and the head office, but not the month of project approval. And so on.

A third point is that most SUDENE reports present investment data in current cruzeiros, i.e. in cruzeiros of the year in which the project was approved. The exception to this rule is the publication entitled Projetos Aprovados 1960-1968. This report claims

²⁷ Several people helped me directly or indirectly gather these data; their names appear in the "Acknowledgements" part.

to present investment information in cruzeiros of March 1968, which it does but not always. This report is in all other respects very reliable, probably one of the best that SUDENE puts out. The dates of approval, the location, and the type of project are almost always correct. Two other reports appeared around this time.

One was Projetos Aprovados Pela SUDENE (Artigos 34/18 leis 3995/61 e 4239/63) Ate 30/06/66. (sic the date was actually 30/06/67, published probably in 1968). The other was Onde Aplicar Seu Imposto de Renda? Projetos Aprovados (Ate 31.12.69). These two reports omit several projects which were approved during the periods covered, but either closed down or never actually used the funds allocated to them. This can be seen by comparing these reports with a list of projects approved by SUDENE between 1960 and 1967 published as an appendix in A SUDENE e a Industrializacao do Nordeste. (FGV EIAP, 1968) or by comparing the above mentioned reports with Projetos Aprovados 1960-1968 or with Projetos Industriais Aprovados 1960, 1961, 1962, 1963 (SUDENE, 1976a-d).

Specifically, Goodman and Albuquerque had said about the report Onde Aplicar o Seu Imposto de Renda? Projetos Aprovados (Ate 31.12.69) that "at first" the report seemed to show adequate information, but that "A more detailed analysis of the material, revealed certain omissions and repetitions, as well as the inclusion of firms which had officially communicated to SUDENE they would not implement their projects..." (Goodman and Albuquerque, 1974:377)

After 1969, data are available on a year by year basis, under the general title of Projetos Industriais Aprovados. This series of publications is fairly standard--most of the reports list the same

variables:.. name of the firm, location of project, year, and sometimes month of approval, etc. The series is also comprehensive--it lists all the projects approved for a certain year, not just those which received incentives through the 34/18-FINOR system; thus it includes reformulations to old projects, reduction or waiver of import duties on machinery, etc.

The 1983 report listing implantation, modernization, and expansion projects, which is based on Relacao dos Projetos Aprovados Pela SUDENE 1963-1982, was sent to us directly from the Superintendent's office at the SUDENE in Recife. It complemented the information we already had though it omitted some projects, especially those before 1970. (A more detailed discussion on what publications were used and what variables were collected is presented in Appendix A.1).

4.2.2 SUDENE Data and Name Changes

One problem which had to be solved in order to assemble a reliable data set on industrial projects approved by SUDENE between 1960 and 1982 was to follow up the change in the name of firms since a majority of them had projects approved by the Agency at more than one time; and/or employment information was recorded at other times from other sources such as the Industrial Cadastres of Pernambuco for 1965 and 1975. The complete list of firms is presented at the end of this thesis in the form of an appendix; the list includes both new and old firm names and firms can be searched either way.

Most of the name changes were noted in SUDENE reports or reports by other Agencies, but others were found by comparing addresses. (Complete firm addresses can be found for all industries in Pernambuco in Cadastro Industrial 1965 and 1975, for industrial projects approved by SUDENE in: SUDENE 1967, 1969d, 1969b, Pernambuco, 1974).

4.2.3 . SUDENE Data and Industrial Classification

For the present study projects were assigned a three digit industrial classification number according to the 1970 industrial classification. In many cases this entailed changing the classification assigned by SUDENE to a project. This recoding of the data was necessary because there were inconsistencies and in some cases errors in the classifications done either by SUDENE or by other agencies. Also we have to remember that there were three different standard industrial classifications in the period 1960-1980 corresponding to the Industrial Censuses of 1960, 1970 and 1975. One publication did not even use the IBGE standard industrial classification but devised a new one (see Pernambuco, 1974:10). When a project listed more than one product, the project was classified by the first product mentioned or if projected production figures were available, by the most important product.

4.2.4 SUDENE Data and the Location of Projects

Initially, each project approved was to be assigned a location in terms of a pair of x,y coordinates. For obvious reasons, the idea was soon dropped; it was realized that it was to be too time consuming, and even if accomplished, irrelevant to the core of the study. Then we decided we would assign each project two numbers: one representing the municipality and another representing the "standard municipality" (see section on the standardization of the municipalities). The idea was modified when we realized that all projects but three had concentrated in municipalities which had remained the same since 1940.

The task, then, was reduced to its minimum expression: assigning a number to each municipality and in turn assigning each project a location. Each municipality was given a number according to its alphabetical order in the Industrial Census of 1940. Thus, any project locating in Recife would be assigned number 64, in Igarassu, 38 etc. However, it turned out that other problems had to be solved. Some publications did not give the location of the project (see for example Projetos Industriais Aprovados 1970, 1972), while others gave sometimes the wrong location, in many cases the location of the head office in Recife (see for example SUDENE, 1967, 1969a, 1969b). When in doubt the actual location of a project was taken to be that presented in either of the Industrial Cadastres (1965, 1975). In the case of some projects locating in the Recife Metropolitan Area, it was not clear where one municipality started and the other ended. Thus, in some reports highway BR-232 km 13 was

still Recife while in others it was already Jaboatao (see Pernambuco, 1976a). We assumed that km 12 of BR-232 marked the boundary between Curado (Recife) and Curado (Jaboatao).

4.2.5 Consistency in the Investment Data Used

Another problem to be solved in this thesis was that of standardizing investment data. In a country such as Brazil where inflation has been quite high, one cruzeiro of 1982 is by no means the same as one cruzeiro of 1960. However, most of the reports published by SUDENE listed investment data in current cruzeiros. And what is even worse is that in some reports no mention was made as to whether the investment data was in current or in constant cruzeiros (see SUDENE, 1967, 1969a, 1969b). More recent reports have clearly specified that investment figures were in current cruzeiros (see SUDENE 1976e-i, 1978b-c, 1980b, 1983a-b). Other reports have listed investment data in constant cruzeiros (see FGV EIAP, 1968; SUDENE, 1968b) though we have found some of the data in both reports to be in current cruzeiros. Lastly, a report by the Government of the State of Pernambuco listing all projects approved by SUDENE in Pernambuco up to December 1974 presented investment data in the worse possible way. It added together data for different years without any warning to the reader. For example the "Companhia Industria de Instrumentos de Preciso - CIIP" manufacturer of alarm clocks and watches was set up in Pernambuco in 1967 and the total investment was to be 8,100,000 cruzeiros. To complement the 1967 project, in 1970, the firm presented and got approved a project involving 13,470,645 cruzeiros (FVG, 1968; SUDENE, 1970). The Government of

Pernambuco publication listed the total investment approved for "CIIP" as 21,570,645 cruzeiros, the result of adding the two previous figures! (see Pernambuco, 1974). We have not crosschecked all investment figures but we have made some random checks and most of them yielded similar results (see on the above mentioned Gov. of Pernambuco report, total investment figures for the following firms: "Aluminio Extrusao e Laminacao", "Aganor Gases e Equipamentos", "Rhodia Northeast S/A", and others, then add investment figures for different years and projects for each firm up to 1974 and figures will be very close or equal). Due to these problems investment data from this publication (Pernambuco, 1974) were discarded.

Investment data were taken from SUDENE publications as explained in Appendix A.1. These data were initially recorded in current cruzeiros and later transformed in constant 1981 cruzeiros by multiplying by a constant for each year. The deflators are those used by the Fundacao Getulio Vargas as presented in SUDENE, 1982a:74.

4.2.6 SUDENE Data: What Other Researchers Have Found

Francesco Adamo reports that,

What may seem like a paradox, but which still is by itself a sign of the scarce results of such policy [SUDENE policy of industrial development], is that no systematic survey has until now been completed...of the results of the tax incentives program, or at least so it seems from the contacts I have had with the institutions interested. That is, it is not even known what approved projects which have already received funds have actually been implemented, nor it is known whether these projects were implemented as it was indicated in the projects themselves (as for type of product, machinery, employment actually created, etc.). (Adamo, 1980:270, footnote 30)

The Pernambucan geographer, Manoel Correia de Andrade noted in a recent book,

We know that the figures for projected employment do not correspond to the figures for actual jobs created but we were unable to get that data at the SUDENE... That is why [in this study] we used data for projected employment. (Andrade, 1981:64, footnote 16, emphasis added)

Goodman and Albuquerque published in 1974 one of the most comprehensive studies on the recent industrialization of the Northeast. They had access to the original files the SUDENE kept on each industrial project the agency approved between 1960 and April 1970. Goodman and Albuquerque's book has an appendix describing the SUDENE data used. In this appendix the authors wrote:

The low quality [precariedade] of the statistics published at the regional level and the non-existence of periodical and systematic evaluations of SUDENE's industrialization program, which has been in effect for the last ten years, limit to a large extent the ambition of doing a comprehensive analysis and demanded a laborious effort in order to gather retrospective information which in some cases could not be obtained. (Goodman and Albuquerque, 1974:377)

Further on, they add,

It was presumed...that the approved industrial projects [actually the files containing this information] would present a relative uniformity, which would greatly facilitate a systematic analysis of them. Unfortunately, this fact proved not always to be true. (Goodman and Albuquerque, 1974:381)

Some of the weaknesses Goodman and Albuquerque note corroborate to some extent what we have already discussed in this section. Furthermore, in the methodological appendix of Goodman and Albuquerque's book we find a list of the main variables collected for each industrial project in the SUDENE Cadastre. As Adamo and Andrade had hinted, out of the 33 variables listed by Goodman and Albuquerque none of them is related to a systematic monitoring of the projects

during the phase of implementation. A common theme in the passages we have quoted from these authors is the lack of data on the actual as opposed to the projected results. This is a point we address in the second part of the next chapter when we discuss projected versus actual employment.

4.3 SUDENE DATA: A SUMMARY

The chapter we now conclude, together with Appendix A describe the data sources used, their main weaknesses, and some of the steps taken to correct these weaknesses. Although some literature already exists which describes and evaluates Brazilian censuses only very spotty and indirect references exist on the quality of SUDENE data sources. This chapter and the first part of Appendix A is a contribution, however small, in that direction. This methodological step was deemed necessary and of utmost importance in order to have some confidence in the analysis of the data undertaken in chapter five.

Chapter V

THE RESULTS OF SUDENE'S INDUSTRIAL POLICIES: THE CASE OF PERNAMBUCO

The purpose of this chapter is to test the hypotheses outlined in chapter three. It begins with a section which measures the performance of the industrial sector of Pernambuco vis-a-vis the Nation throughout the 1940-80 period. This first section sets the scene for a discussion of SUDENE's program of industrial promotion. For this second part the temporal frame of reference is the 1960-75 period. We touch on four aspects of the program: the comparison between projected and actual employment created at SUDENE-supported projects, timing and changes in the 34/18 system with reference to location and employment creation, the overall effects of SUDENE-assisted projects on the location of industry, and the changes induced by SUDENE-assisted projects on the industrial structure of Pernambuco, with particular emphasis on the textiles sector.

5.1 THE PERFORMANCE OF INDUSTRY IN PERNAMBUCO, 1940-1980

5.1.1 Industry in Pernambuco, its Performance Versus the Nation, 1940-1980

The industrial sector of Pernambuco has recorded absolute gains for all intercensal periods except for 1950-1960. However, when compared against Brazil as a whole and even to the Northeast, the industrial sector of Pernambuco has lost ground at least since 1940

even after we allow for a relative decline in the population of Pernambuco both vis-a-vis the Nation and the Northeastern region during the same period.²¹

This is clear in figure 2a where we can see a sharp decline in all the industrial indicators: industrial employment, economically active population in industry (PEA in industry), value of production, for all periods except for a slight increase in the value added in 1975, but a lesser decline in population. However, the decline of Pernambuco has not been at the same rates all throughout the 1940-1980 period.

Figure 2a shows the slopes for all indicators changed in 1960. Although the decline continued, it did so at a slower rate, faster for employment than for the value of production and the value added reflecting the capital intensive character of the new industrialization. This relative decline of industry in Pernambuco vis-a-vis the Nation and the changes in the rates of decline after 1960 is reflected in the shift-share components for employment we have calculated for each of the intercensal periods and which are shown in figure 3.²²

The differential growth (DG) has remained negative throughout the 1940-1980 period, although a recovery is evident after 1960, at decreasing rates after 1970.

²¹ Actually, the population of Pernambuco relative to Brazil's had been declining for a long time before that, from 8.47% in 1872 to 7.19% in 1890, to 6.75% in 1900, with a slight increase in 1920 to 7.03%.

²² $NG_{ij} = E_{ijo} (E_t/E_o) - E_{ijt}$; $IM_{ij} = [(E_{it}/E_{io}) - (E_t/E_o)] E_{ijo}$;
 $DG_{ij} = E_{ijt} - [(E_{it}/E_{io}) E_{ijo}]$; $TS_{ij} = (IM_{ij} + DG_{ij}) = E_{ijt} - [(E_t/E_o) E_{ijo}]$;
 $PM_{ij} = RP_{ij} - IM_{ij} = [(E_o/E_t) - (E_{io}/E_{it})] E_{ijt} - [(E_{it}/E_{io}) - (E_t/E_o)] E_{ijo}$;

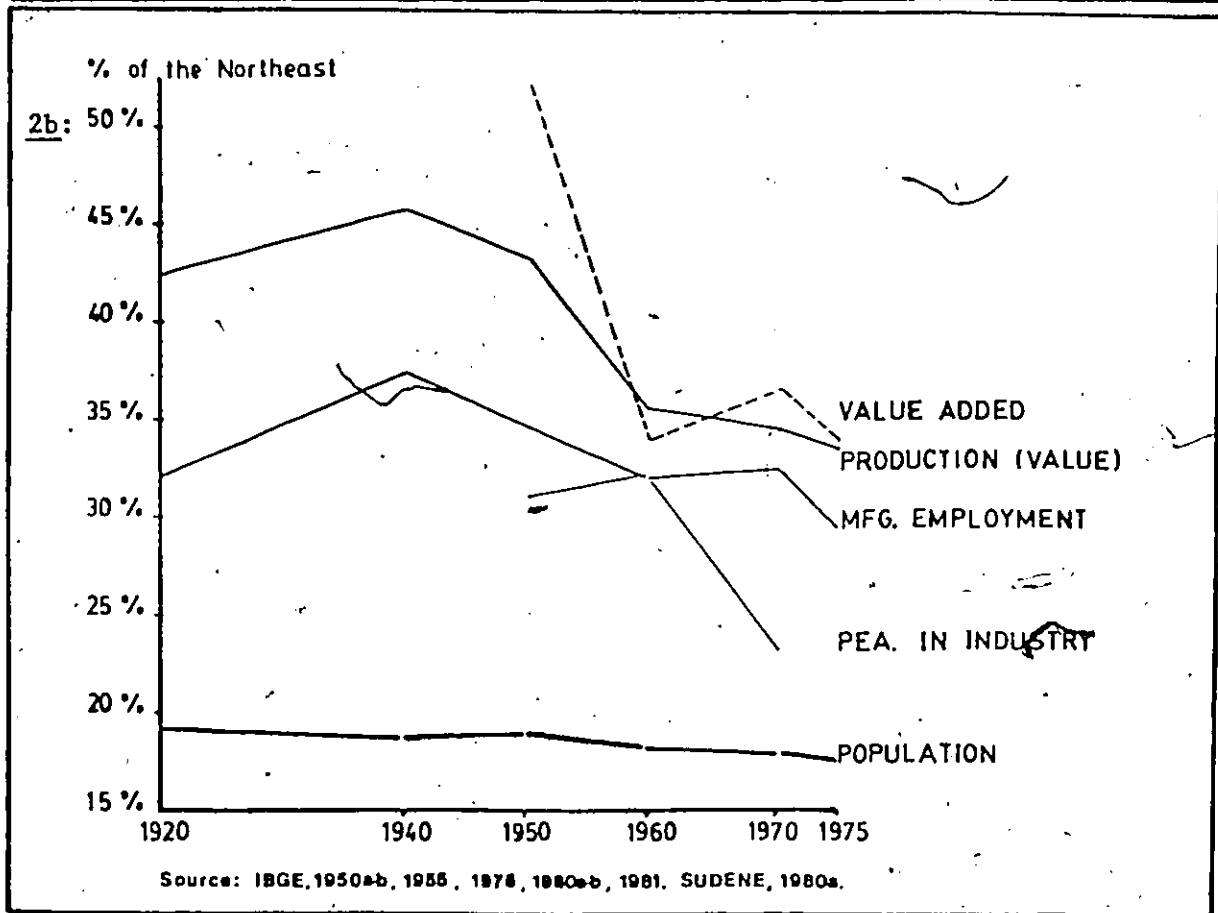
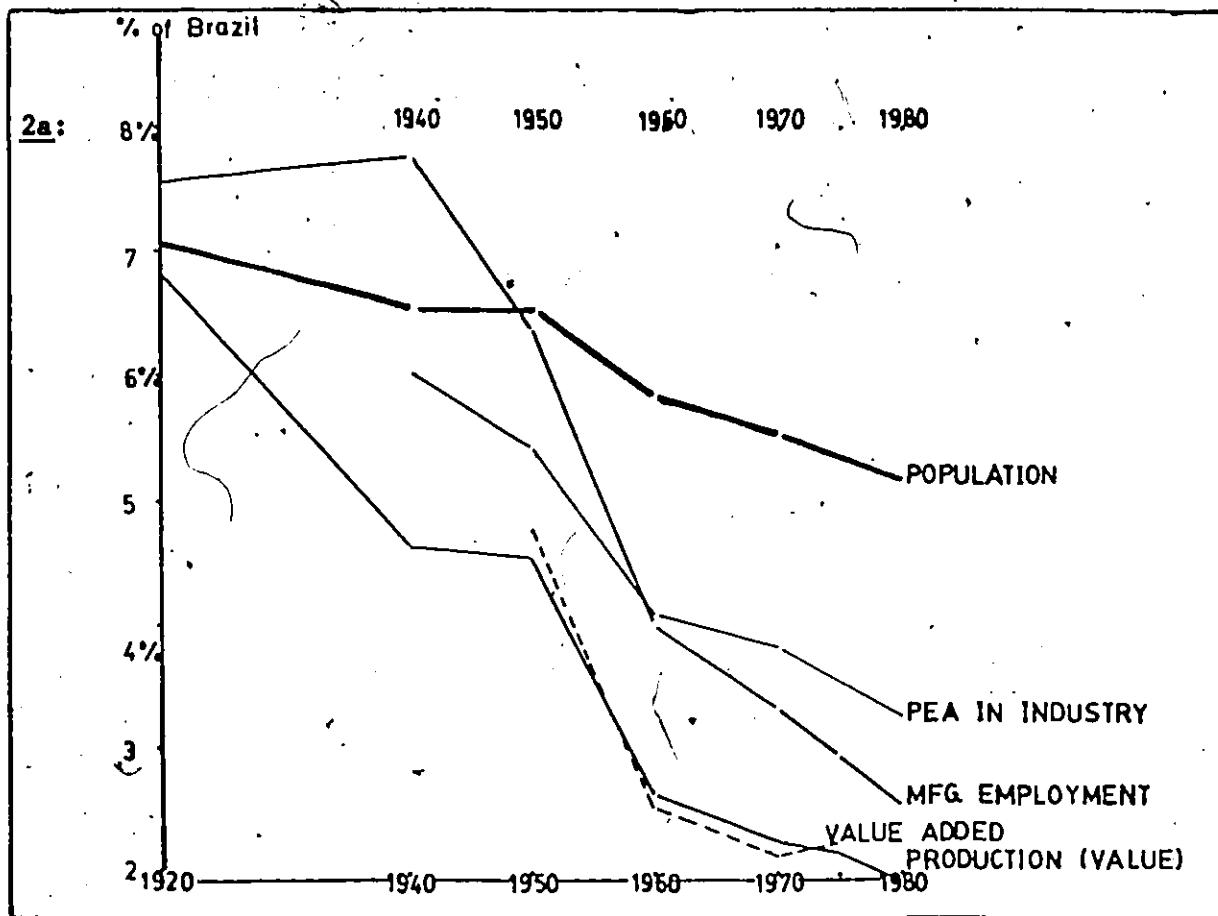


Figure 2: Pernambuco's Share of Brazil's and the Northeast's Industrial Activity, 1920-80

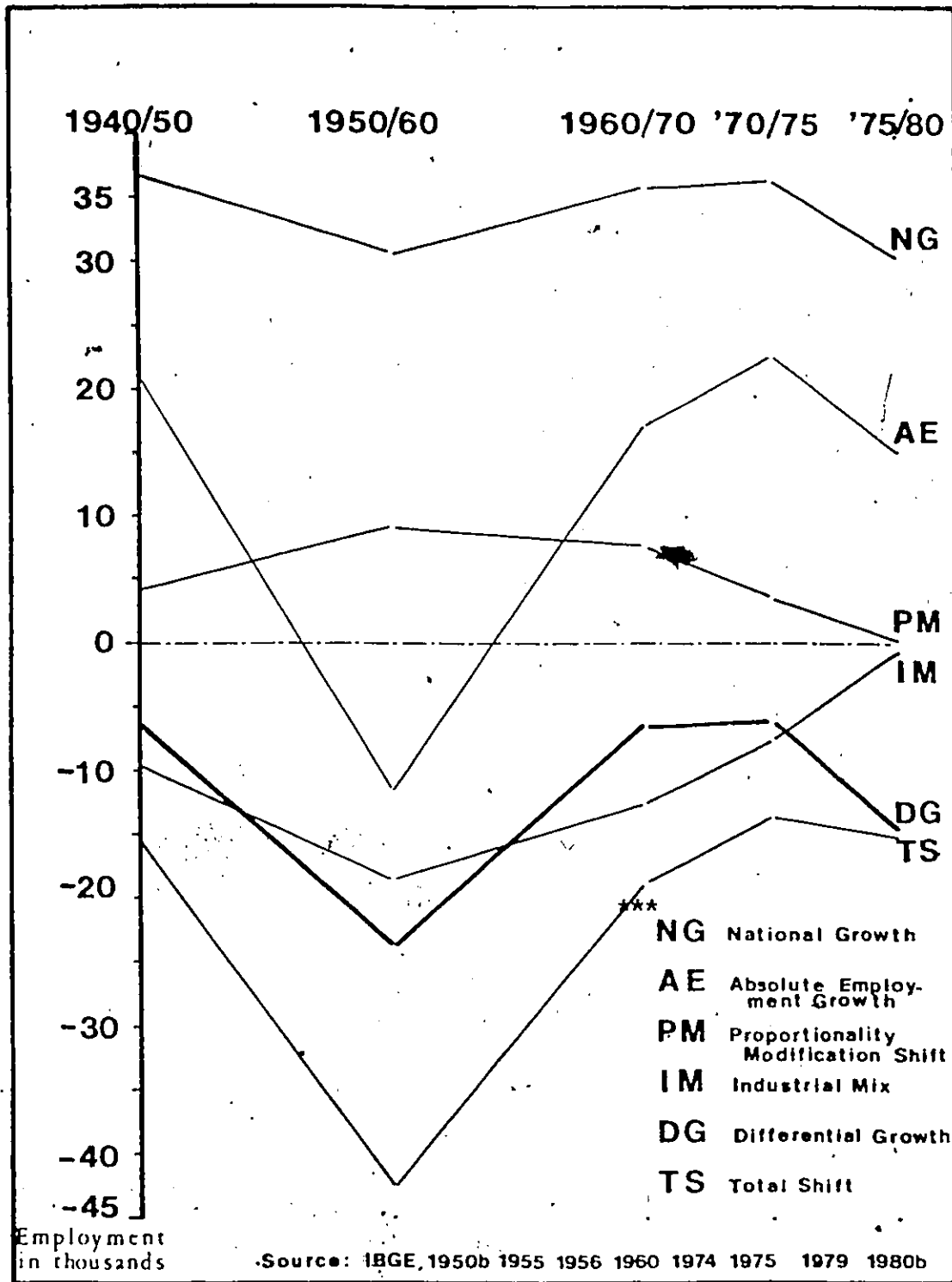


Figure 3: Shift-share Components for Industrial Employment in Pernambuco, 1940-80

Of these shift-share components one of the most important ones for us at this stage is differential growth since it measures whether the regional industry grew faster or slower than its national counterpart.

TABLE 4

Industries Included in Each Dynamic or Traditional Group

Dynamic (A)

Machinery
Communications and Electrical Equipment
Transport Equipment

Dynamic (B)

Non-metallic Minerals
Metallurgy

Dynamic (C)

Paper, Rubber, Chemicals, Pharmaceutical, Perfumes,
Plastics

Traditional (A)

Textiles
Food Products

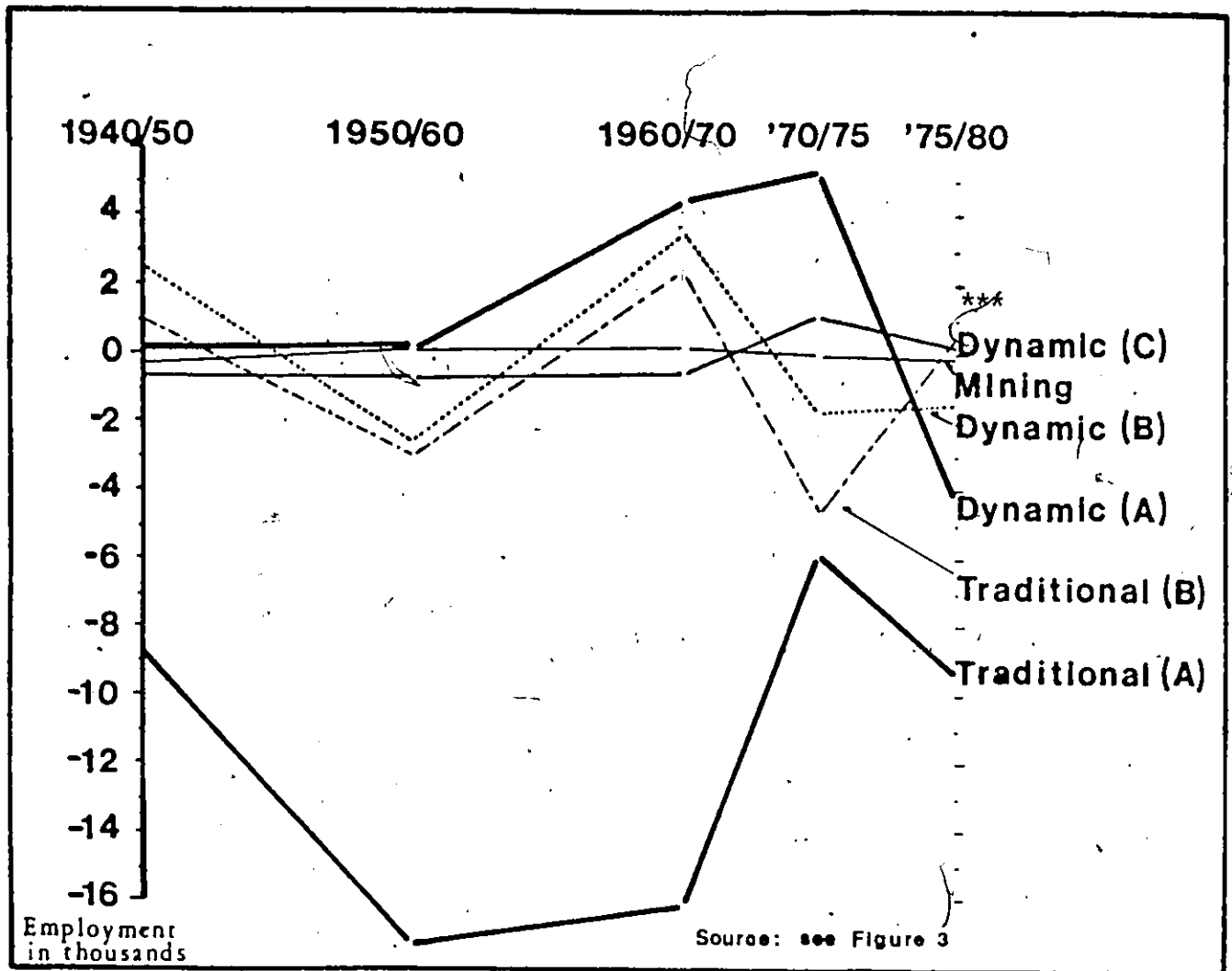
Traditional (B)

Wood Products, Furniture, Leather, Clothing,
Beverages, Tobacco, Printing, Others

Mining

Note: the classification used in this table is a modified version of a classification widely used in Brazil. We have only subdivided the "traditional" group in two and the "dynamic" sector in three instead of two (as used by Moreira, 1978:129).

Throughout the text dynamic and modern refer to the same group of industries.



*** For formulations see footnote 29 page 65.

Figure 4: Differential Growth, Pernambuco Versus Brazil, 1940-80, by Groups of Manufacturing

If we disaggregate DG we can identify the groups of industries responsible for most of the variation in DG. We have classified industries in six groups: Dynamic (A), Dynamic (B), Dynamic (C), Traditional (A), Traditional (B), and Mining as table 4 shows.

Even at this level of disaggregation we can see that all the groups of industries have grown at a faster rate after 1960. From 1970 onwards, however, the situation has deteriorated. This is directly related to a sharp drop in the number of industrial projects approved by SUDENE after 1970. (See figure 4)

5.1.2 Industry in Pernambuco, its Performance Before and During SUDENE, 1940-1975

In terms of employment, the performance of industry during the period 1960-1975 was better than during the period 1940-1960. Between 1940 and 1960 industrial employment in Pernambuco only grew by 9,325, essentially due to an absolute decline of 11,773 between 1950 and 1960; whereas between 1960 and 1975 industrial employment increased by 40,239 (data were adjusted as explained in A.3). In terms of value added and value of production the performance of the Pernambucan industry was substantially better after 1960 than before 1960. Although between 1950 and 1960 the value added and the value of production increased by only 3.6% and 16.6% respectively, between 1960 and 1970 they increased by 134% and 130%. In the 1960-1975 period, the value added increased from 3,672,960 thousand cruzeiros (1978) to 13,520,733 thousand cruzeiros (1978), or a 3.7 fold increase! The value of production went from 8,567,884 thousand cruzeiros (1978) to 33,864,883 thousand cruzeiros, or a four fold in-

crease! (Data from Industrial Censuses 1940-1975, employment adjusted as explained in A.3, value added and value of production in thousand of constant 1978 cruzeiros).

5.1.3 Conclusion

The performance of the industrial sector of Pernambuco vis-a-vis the Nation's has been very poor during the 1940 to 1980 period. When growth has occurred it has been due to a large extent to external conditions: the second World War in the period 1940-1950, and the change in the policies of the State at the end of the 1950's--change which resulted in the creation of SUDENE and the promotion of industry.²⁰ However, this growth has never been enough to surpass the growth of industry for the Nation as a whole.

During the 1940-1980 period, the industrial sector of Pernambuco has not succeeded in keeping pace with the industrial sector of Brazil, either before or after 1960--time of the creation of SUDENE. Nonetheless, there is a clear and significant change in the trends after 1960, change we associate mostly with SUDENE's program of industrial promotion. This change has lessened the rates at which Pernambuco was losing ground before 1960 as reflected in the slopes for all indicators (Figure 2a). When compared against the Northeast, Pernambuco has had a better performance after 1960 (Figure 2b). If we look at groups of industries, taking employment as indicator the situation is less clear cut.

²⁰ This is discussed at length, though in terms of the Northeast as a whole, in the seminal essays of Antonio Barros de Castro (Castro, 1971:Vol II).

Figure 4 shows all groups of industries have shown a recovery after 1960. However, the Traditional (A) Group (Textiles and Food Products), has continued to perform poorly, and after a peak in 1975 it has dropped once again.

The relatively better performance of industry in Pernambuco vis-a-vis Brazil and the Northeast after 1960 is explained by the tremendous absolute growth of the Pernambucan industry in the same period. These findings lead us to reject hypothesis 1a and to accept hypothesis 1b. The performance of the industrial sector of Pernambuco vis-a-vis the industrial sector of Brazil has been affected after 1960 by the implementation of a very large program of industrial development implemented by SUDENE. The examination of some aspects of this program is the subject of the next three sections.

5.2 THE SUDENE-SUPPORTED INDUSTRIES, 1960-1974

5.2.1 Projected Versus Actual Changes

It does not take long for any student of the industrialization promoted by SUDENE to realize that projected employment figures for industrial projects do not match actual employment figures. For example, for the Northeast as a whole SUDENE estimated that between 1960 and 1967 it had actually created 37,139 jobs--only 29,900 jobs if job losses due to modernization are taken into account (SUDENE, 1968a:Quadro 7; in Castro, 1971:196). However, according to Hirschman the projected employment for this period was 67,800; and according to SUDENE 101,102! (Hirschman, 1968:18; SUDENE, 1980c:102) Also for the Northeast as a whole, it was estimated that between 1960 and

1974 SUDENE had actually created 100,000 industrial jobs; the projected figures for the same period were around 180,000 (UFP/PIMES 1978:54 cited in Neto, 1982:487; projected figures from Ribeiro, 1976). As we will see, this discrepancy between actual and projected figures is also present in the data for Pernambuco.

There are four main reasons for this discrepancy. Firstly, some firms never carry out the projects proposed. Secondly, some firms close down temporarily or permanently. Thirdly, at least until 1971 SUDENE has reported employment for modernization projects as net additions, that is, the total number of jobs at a plant after the modernization or expansion although the project may have actually resulted in a net displacement of labor. Finally, there is a time lag between the approval of a project and its full implementation. This lag is related to the speed with which the firm receives its funds and puts them to use.

5.2.1.1 Projected and Real Employment

A discrepancy between projected and actual employment can be seen by comparing employment figures from the Industrial Censuses with the projected employment figures of SUDENE (see table 5). The 1960 Industrial Census reported the industrial labor force of Pernambuco to be 72,058. The 1975 Industrial Census reported this figure to be 112,297. The absolute difference between the two censuses is 40,239. The projected employment for SUDENE approved projects for the period 1960-1974 was 77,791. Undoubtedly, even allowing for problems of comparability, the SUDENE figure does not represent an

absolute net addition to the labor force. Indeed, as table 5 shows, the difference between one and the other is 37,552.

TABLE 5

Discrepancy Between Industrial Censuses and SUDENE Figures,
Pernambuco, 1960-1975

Industrial Census	1960	72,058 jobs
Industrial Census	1975	112,297 jobs
A Difference 1960-1975		+40,239 jobs
B Projected Employment in SUDENE Projects 1960-1974		77,791 jobs
Discrepancy Censuses/SUDENE B-A		37,552 jobs

Note: SUDENE projects exclude fishing, telecommunications, and agri-projects. See chapter 4

Even if we assume that all the increase in industrial employment in Pernambuco between 1960 and 1975 results from the implementation of SUDENE projects this will only give us 40,239 jobs, not 77,791; and we will still have to account for 37,552 jobs.

5.2.1.2 Not Implemented and Failed Projects

As outlined at the beginning of this section, some firms do not implement their projects. According to Goodman and Albuquerque in the period 1963-1969 the firms in charge of 67 projects communicated to SUDENE they would not implement their projects. Of the 67

projects, 25 were to be located in Pernambuco. With 25 projects Pernambuco had the largest share of the projects which were not carried out followed by Ceara with 14 (Goodman and Albuquerque, 1974:395).

As of 1967, John Sutherland found that of 420 projects approved under the 34/18 system between 1963 and 1967, 166 had "simply fallen by the wayside." (Sutherland, 1967:150). That is, they had not been undertaken. Sutherland went on further to say that,

For instance, of the total 684 projects approved by the SUDENE (up till April 1967), only about 200 are expected to be in any kind of operation by the end of 1967 according to the SUDENE's industrialization chief. The attrition is high among those projects requiring Article 34-18 support, and the number of such projects is increasing both absolutely and relatively....(Sutherland, 1967:149)

For all the Northeast for the period 1960-1976 it was estimated that 23% of the SUDENE projects had expired.²¹ A sample survey undertaken around this time found in Pernambuco the existence of a large number of firms which had their activities paralyzed. (Ferreira et al, CAEN-SUDENE, 1979:20).

This leads us to a second group of firms: the firms which carry out a project and later on suspend their activities. For the whole of the Northeast the 1976 SUDENE report cited above estimated that 2.3% of the projects had their activities suspended by December 1976. In 1978 this figure was 17.4% according to another survey, although these firms had received only 5.6% of the investment and were to create 9.6% of the jobs (SUDENE, 1980c:105). Furthermore

²¹ SUDENE. Relacao das Empresas e Mao-de-Obra Prevista pelos Projetos Aprovados pela SUDENE. Recife, 1976. in Ferreira et al, CAEN-SUDENE, 1979:21.

this same survey had found that another 11.5% of the firms were having problems (em funcionamento com problemas). This 11.5% corresponded to 18.5% of the investment and 10.5% of the 34/18 investment.

If we consider the firms that did not undertake their projects or closed down then we add those projects that have not yet been implemented or which are being implemented, our own estimates for Pernambuco place this figure for the period 1960-1974 at 84 firms. These 84 firms involved 114 projects and the projected employment amounted to 12,424.¹²

TABLE 6

SUDENE Projects which Closed Down, were not Undertaken, or have not yet been Implemented, Pernambuco, 1960-1974

	Absolute	% of total
Number of Firms	84	26.75%
Number of Projects	114	22.44%
Projected Employment	12,424	15.97%
Total Investment	21,958,240	10.81%
Total 34/18	9,801,819	11.18%

Source: SUDENE Reports. Calculations by the author.
Note: investment values are in thousands of 1981 cruzeiros.

¹² Employment data were missing for 8 projects.

We arrived at the figures on table 6 in two steps. First we considered all those projects listed neither in the Cadastro Industrial de Pernambuco, 1975/76, nor in Pernambuco Industrial (1974) and/or those projects listed as having closed down in SUDENE (1968b) and Pernambuco (1976a). This gave us 38 firms with 47 projects and an expected employment of 4806. Second, we considered all those projects which were listed neither in the Cadastro nor in Pernambuco, 1976a. This gave us 47 firms with 67 projects and an expected employment of 7,618.

Our deductions and the method we have used may be open to some criticism but the margin of error is not greater than 2,000 jobs one way or the other. The two steps in our procedure rest essentially on information from the Cadastro Industrial de Pernambuco, 1975/76. The Cadastre has already been used by a geographer of the Northeast, Mario Lacerda de Melo (Melo, 1978). An earlier edition of the Cadastre had already been published in 1973/74, and was used in an analysis of the industrial sector of Pernambuco by Jorge Jatoba (Jatoba, 1975b:332-334). Both editions were published by FIEP and NAI (Federação das Industrias do Estado de Pernambuco; Núcleo de Assistência Industrial), that is a private and a public institution without a direct relation with SUDENE. The total industrial employment of Pernambuco for 1975/76 was according to the Cadastre equal to 112,005 (calculated in Melo, 1978:181). The Industrial Census for 1975 recorded 112,297. The small difference between one source and the other may be explained by the fact that the Cadastre did not include those employed in Mining (602 according to the Industrial Cen-

sus). The Cadastre includes "all the manufacturing firms operating in Pernambuco in 1975." (Pernambuco, 1976b). Then, it follows that those firms not listed either function clandestinely, do not operate any longer, or have temporarily closed down. Because the firms receiving incentives from SUDENE have to be registered the first point cannot be true. So at least the great majority of those firms not listed in the Cadastre are no longer operating or have not started operating.

5.2.1.3 Corrected Employment Figures

Table 7 shows the corrected SUDENE employment figures after we excluded those projects which were not operating as of 1974/75/76. The table also shows the recorded employment and the net employment. The recorded employment 1975, C, is the total employment at SUDENE projects in 1975 including the employment existing before 1960.¹¹ Net employment is the net employment addition of one or more SUDENE projects to the total employment of an establishment. Thus, net employment figures do not include the employment in an establishment before the implementation of a project, nor do they take into account employment losses due to modernization. Net employment data were taken from Pernambuco Industrial, 1974.

The differences shown in table 7 can be explained as follows. H, the difference G-C, 4,847 jobs, is the number of jobs not yet created at projects which are already under way. Ia is the existing

¹¹ It may also include a small number of jobs created as a result of the implantation of a firm without the assistance of SUDENE between 1960 and 1974. The firm may have subsequently presented a modernization or expansion project to SUDENE.

TABLE 7

Employment Data for SUDENE Projects Approved in Pernambuco Between
1960 and 1974

Code	Label		Source
A	Projected Employment	77,791	SUDENE Reports 1960-74
B	Employment Not Created	12,424	Different Sources (see text)
C	Recorded Employment	60,520	Cadastro Industrial 1975, FIEP NAI
D	Net Employment	45,132	Pernambuco Industrial 1974 Gov. of Pernambuco
E	Recorded Employment	15,886	Cadastro Industrial 1965, IBGE (a
F	Absolute Intercensal Difference 1960-1975	40,239	Censo Industrial 1960, 1975 IBGE
G	Corrected (A - B)	65,367	
H	To be created (G - C)	4,847	
Ia	Existing (C - D)	15,388	
Ib	Existing (E - J)	12,451	
J	Created (1960-65)	3,435	

Note: (a) Acronyms are spelled out in Appendix D. For more detail on the methodology used to collect this information see chapter 4 and appendix A.1. Calculations by the author.

employment before 1960 at firms that received funds from SUDENE. Ib is another way of calculating the existing employment before the creation of SUDENE. We have subtracted the employment actually created by SUDENE in the period 1960-1965 from the total employment recorded for firms receiving funds from SUDENE in 1965. The fact that D is larger than F shows that the pre-existing employment de-

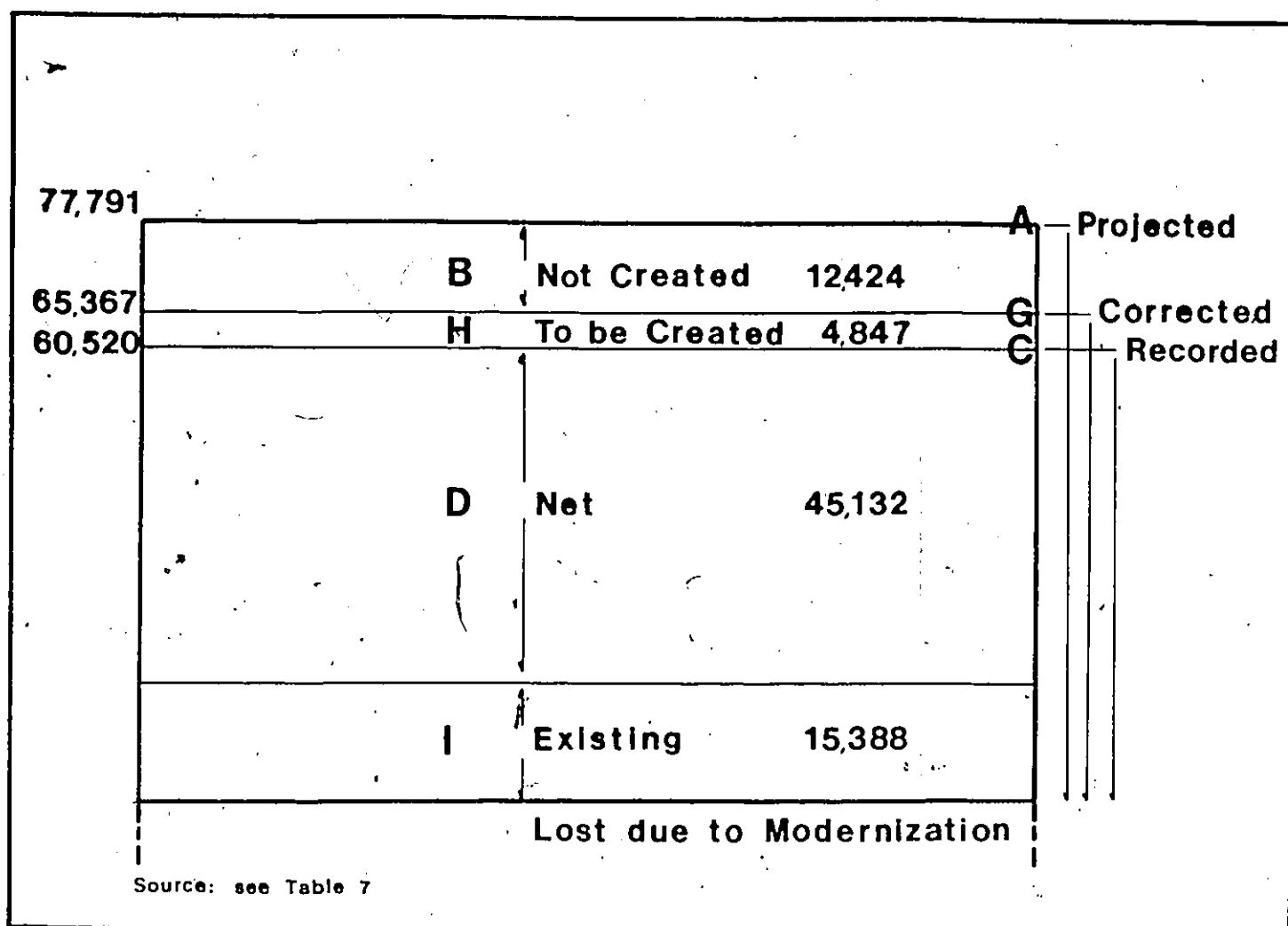


Figure 5: Employment Data for SUDENE Projects Approved in Pernambuco Between 1960 and 1974

clined during the period 1960-1974. The mechanisms behind some of these differences can be better understood if we know how SUDENE counted the projected employment in modernization projects and how a time lag exists between approval and full implementation.

SUDENE has counted--at least until 1971-- the total employment at an establishment after modernization as a net addition, even though this modernization might have actually displaced labor, or created very little employment.³⁴ This is nothing new. In 1972 Goodman said that jobs resulting from modernization projects should not be counted as net additions, for these numbers are not the difference between pre and post modernization, but rather the net number of jobs available at a plant after modernization (Goodman, 1972:251). Goodman added that "Informal observers estimate that such projects dispense with between 30 percent and 50 percent of the pre-modernization labor force." (Goodman, 1972:253, see also Castro, 1971:220)

Still before him Wadsted had shown that fiscal incentives had a negative impact on employment--between 1959 and 1965 total industrial employment fell 14% as a result of substituting capital for labor (Wadsted, 1968:259).

With the data we have it is impossible to know whether this has been the case for all modernization projects because most firms have implemented more than one project at the same establishment. Moreover, in many cases more than one type of project may have been im-

³⁴ A detailed discussion of the impact of modernization on employment in the textile sector of Pernambuco is undertaken in section 5.2.4.3.

plemented at the same establishment. For instance a firm may have located, later modernized, and later still expanded as a result of undertaking three different projects in the same establishment at three different times. Since we only have data at the establishment level, the individual impact on employment of each project cannot be evaluated. However, we can look at some firms which had only one modernization project approved. Of all the projects approved between 1960 and 1974 which in 1974/75 were operating, we find 25 met these requirements. The total projected employment for these projects was 4,827; the net employment created amounted to only half, 2,212; and the recorded employment in 1975 was 7,767. So, this means that around 5,000 jobs existed there before modernization ($7,767 - 2,212$), and that around 2,000 were created with or after modernization. This somehow contradicts Goodman's findings (see above), for though we know that only about half of the projected jobs were actually created, at least some modernization projects seem to have resulted in a net addition. What we do not know, however, is whether the post-modernization employment was smaller than the pre-modernization employment simply because we do not have such data. Nonetheless, using data from the Cadastro of 1965 we compared the pre and post-modernization employment of projects approved in 1966, 1967, and 1968. The results from this test, however, have to be taken with great caution because the employment data from the Cadastro were originally in class intervals (see Appendix A.1.3).

We took all the modernization projects approved in 1966, 1967,

and 1968 which were also in existence in 1965.³⁵ The idea was to see whether the employment before modernization was larger than after modernization; which would show that actually modernization projects did away with a portion of the pre-existing employment. We found 11 modernization projects that met these conditions. The projected employment for these projects amounted to 3,121 while the pre-existing employment was 2,795. That is, the net employment created amounted to a mere 326 jobs. And this only because one project recorded a large gain (471 jobs). When this project is excluded we are left with, $471 - 326 = 145$, 145 fewer jobs than before modernization.

There is a time lag between the approval of a project and its full implementation. This lag is related in part to the time it takes for a firm to receive the funds approved.

5.2.1.4 The Time Lag Between Approval and Implementation

The figures in table 8 show that there has always been a time lag between approval and actual disbursement of 34/18 funds. Furthermore, the disbursement figures may actually be inflated because some firms re-apply for a correction of the funds to be received in accordance with inflation. This can be seen more clearly in a work by Andrade (1981:63). Although using total investment figures, Andrade shows that the disbursed investment was larger than the approved investment not because its real value was larger but because the lag between approval and disbursement prompted firms to have the funds to be received adjusted for inflation.

³⁵ Data from Cadastro Industrial, 1965 (IBGE, 1968a).

TABLE 8

Pernambuco, Projected, Allocated, and Disbursed 34/18 Funds, 1965,
1967, 1969

Funds from the 34/18 System in cr\$ 1,000 Historical Values

1960-1965	Projected	20,100
	Allocated	14,688
	Disbursed	8,852
1960-1967	Projected	147,872
	Allocated	81,004
	Disbursed	59,971
1960-1969	Projected	582,996
	Disbursed	337,031

Sources: Calculated from SUDENE, 1965, 1967, 1969b

Note : Projected, Allocated, and Disbursed are translations of
Previsto, Indicado, Liberado or Efetivamente comprometido.

The time lag between approval and disbursement of funds coupled with other problems at the stage of project implementation results in a certain delay which can be better appreciated by looking at table 9. The table shows the situation of industrial projects approved by SUDENE in Pernambuco at different time periods. We can see that at any particular time there are always projects being undertaken and projects which are only at the planning stage. Detailed comparison between different years is not possible without taking certain aspects into consideration. The first point is that

none of the sources covers all of the firms at any particular time (see difference between Totals and N Firms). Some sources include or exclude certain projects. For example the data set for 1976 includes only projects in the Recife Metropolitan Area. The data set for 1972 includes some projects which had closed down. Finally, all of the sources underestimate the number of projects which temporarily or permanently have ceased operating or the projects never undertaken. Still the table is useful for it shows the situation of projects at specific time periods.

5.2.1.5 Summary and Conclusion

We have seen in this section that projected employment figures do not match actual employment figures. We have also seen that there are several reasons for this discrepancy: (a) some firms never carry out the approved projects, (b) some firms close down, (c) SUDENE recorded employment at modernization projects as net employment addition, and (d) there is a time lag between approval and implementation. Using other data sources we have been able to correct projected employment figures by subtracting the projected employment to be created at firms not in existence as of 1975. That is, we have used the data triangulation method. We have to conclude from the examination of the net employment created that SUDENE-assisted projects actually created only about 58% of the projected employment (table 7). This leads us to reject hypothesis 2 for the criterium of success adopted was 80% or more. Nevertheless, SUDENE-assisted projects maintained 15,388 jobs (the existing

TABLE 9

Situation of SUDENE-Assisted Industrial Establishments at Different Time Periods in Pernambuco

Situation	1967	1968a	1968b	1972	1974	1976
New, Functioning	32	32	39	75	59	67
New, Under Way	25	32	50	45	101	5
Modernization Completed			9	43	24	8
Modernization	66		26		2	
Modernization Under Way		85	25	9	45	1
New Projected	24	47	12		14	1
Modernization Projected	4		7	15	1	
New in Expansion						2
Not in Operation			2			3
TOTAL	151	196	170	187	246	88
N Firms	162		212	280	306	312
N Projects	229		301	492	539	578

Sources: 1967 (Dec) FGV. EIAP, 1968.
 1968a (Jul) Tamer, 1970.
 1968b (Dec) SUDENE, 1968b.
 1972 (Oct) SUDENE Informa, 1972b.
 1974 Pernambuco, 1974.
 1976 Pernambuco, 1976a.

Note: Calculations by the author except for 1968a.

employment), created around 45,132 new jobs, and were to create an additional 4,847 jobs.

The creation of these jobs, at some firms, however, has been accompanied by a decrease in employment due to a reduction in operations and even closure at others. We suspect, also, that some employment creation has taken place without SUDENE's assistance.' ' Although we have no data which specifically show to what extent there may have been a loss of employment, the net employment created at SUDENE-assisted projects exceeds the absolute intercensus difference. Thus, though SUDENE-supported projects created 45,132 jobs between 1960 and 1974, the difference between the 1960 and 1975 Industrial Censuses amounts to 40,239 jobs. So, at least 5,000 jobs were lost in this period if we credit all the employment change to SUDENE-assisted projects; however, since some employment creation must have taken place without SUDENE's assistance, the number of jobs lost may be higher.

Although we are not concerned specifically with the number of jobs lost parallel to the implementation of SUDENE projects, these jobs have to be taken into account if we are to evaluate the absolute employment impact of the program of industrial promotion. This is a point which will be discussed in the next two sections.

' ' This is discussed in more detail in subsection 5.2.3.1. Part of this suspicion arises from the fact that not all projects were approved. For example, in 1973, in Pernambuco, out of 77 projects presented to SUDENE, 14 were turned down (SUDENE, 1973b:26). For all of the Northeast, in 1973, out of 168 projects, 61 were turned down; in 1972 out of 423 projects, 74 were not approved (SUDENE, 1972a:21). So, we infer from this that some entrepreneurs, not being able to secure aid from SUDENE, may have been forced to undertake ventures fully on their own capital.

5.2.2 Timing and the Changes in the 34/18 System

5.2.2.1 Introduction

In chapter three we hypothesized that the 1969 changes in the 34/18 scheme resulted in a change in the location pattern of SUDENE-assisted industrial projects. In this section we will test this hypothesis by comparing the location of projects before and after March 1969. In this section we will also test the hypotheses that the March 1969 changes in the system of incentives resulted in greater employment creation per unit of investment, and in greater absolute employment creation.

We will measure the location of projects in terms of four indicators: number of projects, projected employment, projected total investment, and projected 34/18 investment¹⁷ to see if after March 1969 industrial projects have tended to locate out of the Recife Metropolitan Area (RMA) to a greater extent than before March 1969. The creation of employment will be tested by comparing the number of jobs and the ratio investment/job before and after March 1969.¹⁸

5.2.2.2 Location: In or out of the Recife Metropolitan Area?

In both periods--1960 to March 1969 and April 1969 to 1974--SUDENE-assisted industrial projects have concentrated in the Recife Metropolitan Area (RMA). As we can see in table 10, the RMA has not only received the majority of the projects, but it has even

¹⁷ Total investment includes 34/18 investment; hence 34/18 investment is a subset, a portion, of total investment.

¹⁸ The data used in this section exclude those projects which were never implemented or which had closed down as of 1975. That is we will use corrected SUDENE data.

received a still larger proportion of the total number of jobs, the total investment, and the total 34/18 investment. This would come as no surprise for Recife is the first metropolitan area of the Northeast and hence an advantageous location for the establishment of industry. Nonetheless, the share of the municipalities out of the RMA was in the second period around four percent larger for all four indicators. As we can see in table 10, the relative share of the municipalities out of the RMA went from 17.79% to 22.67%, from 12.58% to 14.99%, from 9.71% to 12.65%, and from 11.34% to 16.77%, for the first and second periods, for number of projects, jobs, investment, and 34/18 investment respectively.

TABLE 10

Characteristics of the SUDENE Projects Locating in Pernambuco in 1960-74 by Period, by Location

	In the Recife M A		Out of the Recife M A	
	1960-69	1969-74	1960-69	1969-74
Projects	82.21%	77.32%	17.79%	22.67%
Jobs	87.42%	85.01%	12.58%	14.99%
Investment	90.29%	87.34%	9.71%	12.65%
34/18	88.66%	83.23%	11.34%	16.77%

Source: SUDENE Reports, calculations by the author.

Note: values for jobs are in units, for investment and 34/18 investment in thousands of 1981 cruzeiros.

In both periods, if we compare the projects locating in the RMA with those locating elsewhere in Pernambuco, we can see that the RMA has not only attracted more projects but it has also attracted larger (in terms of investment) and more capital intensive projects than the rest of Pernambuco. This can be appreciated better by looking at table 11.

Table 11 shows the number of projects locating in the RMA and elsewhere in Pernambuco classified by total investment. The relative values are in reference to the total number of projects locating in each area (in the RMA or elsewhere in Pernambuco). We can see that in the first period municipalities inside the RMA have attracted a larger share of large projects--in relation to the total number of projects locating in the RMA-- than municipalities outside of the RMA. Conversely, municipalities out of the RMA have tended to attract in relative terms a larger share of small projects (table 11).

Whereas in the first period, 62.22% of the projects locating out of the RMA were in the bottom class, in the second only 23.08% were in this class (table 11). Conversely, whereas in the first period the five top classes contained only 15.55% of the projects locating out of the RMA, in the second these same classes contained 43.59% of the projects locating out of the RMA.

The same phenomenon had occurred with the projects locating in the RMA--their size had increased. Whereas in the first period 45.67% of the projects locating in the RMA were in the bottom class, in the second, only 37.59% were in this class. As for the larger

TABLE 11

Distribution of SUDENE Projects by Size of Investment, Location, and Period in Pernambuco, 1960-74

	In the Recife M A		Out of the Recife M A	
	1960-69	1969-74	1960-69	1969-74
1 *	45.67%	37.59%	62.22%	23.08%
2	13.46%	9.77%	13.33%	20.51%
3	9.13%	5.26%	8.89%	12.82%
4	2.40%	9.02%	2.22%	12.82%
5	3.36%	1.50%	2.22%	2.56%
6	15.86%	18.80%	2.22%	17.95%
7	5.76%	9.77%	8.89%	10.26%
8	4.33%	8.27%	--	--
TOTAL	100.00%	100.00%	100.00%	100.00%

Source: SUDENE Reports, calculations by the author.

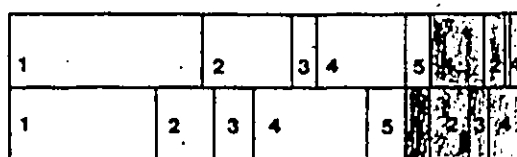
	----Actual Range----	-----Cumulative-----
Note: * 1	0 to 71,416 thousand,	0.04 quintile
2	71,417 to 142,374 "	0.08 quintile
3	142,375 to 213,332 "	0.12 quintile
4	213,333 to 284,290 "	0.16 quintile
5	284,291 to 355,250 "	0.20 quintile
6	355,251 to 710,042 "	0.40 quintile
7	710,043 to 1,774,418 "	1.00 quintile
8	1,774,419 and + "	5.00 quintiles

Values are in thousands of 1981 cruzeiros.

projects, whereas in the first period the top five classes contained 31.71% of the projects locating in the RMA, in the second these same classes contained 47.36% of the projects locating in this area. So

Projects

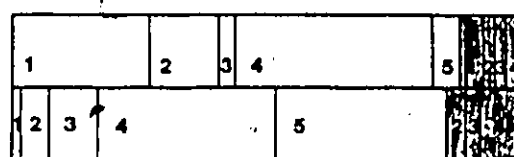
In the RMA 82% Out RMA 18%



In the RMA 77% Out RMA 23%

Jobs

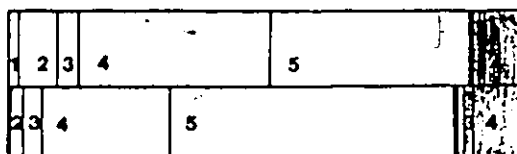
In the RMA 87% Out RMA 13%



In the RMA 85% Out RMA 15%

Investment

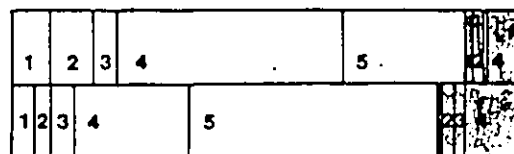
In the RMA 90% Out RMA 10%



In the RMA 87% Out RMA 13%

34/18 Investment

In the RMA 89% Out RMA 11%



In the RMA 83% Out RMA 17%

RMA Recife Metropolitan Area

Classes are by size of investment: 1, lowest 0.04 quintile (Q); 2, 0.08 Q; 3, 0.08 Q; 4, 0.08 Q; 5, top 4 quintiles.

Source: SUDENE Reports. Projects not in existence as of 1975 are excluded.

Figure 6: Projects, Jobs, and Investment, by Investment Classes, Location, and Period

TABLE 12

Projects, Jobs, and Investment, by Investment Classes, Location, and Period

First Period, 1960-1969(March)								
In the Recife M A					Out of the Recife M A			
Projects	Jobs	Invest't	34/18	Projects	Jobs	Invest't	34/18	
1)	37.55%	26.37%	2.14%	7.78%	11.08%	4.99%	0.68%	1.68%
2)	18.58%	13.77%	7.67%	7.97%	3.96%	2.03%	1.69%	2.22%
3)	4.75%	3.46%	4.38%	4.61%	0.78%	1.70%	0.71%	0.25%
4)	17.78%	38.20%	37.20%	44.64%	1.97%	3.85%	6.62%	7.17%
5)	3.56%	5.62%	38.90%	23.64%	0	- -	- -	- -
TOT	82.21%	87.42%	90.29%	88.66%	17.79%	12.58%	9.71%	11.34%

Second Period, 1969(April)-1974								
In the Recife M A					Out of The Recife M A			
Projects	Jobs	Invest't	34/18	Projects	Jobs	Invest't	34/18	
1)	29.07%	1.36%	0.61%	4.81%	5.23%	0.43%	0.09%	0.57%
2)	11.62%	5.15%	2.60%	2.89%	7.56%	3.17%	1.80%	2.78%
3)	8.14%	9.11%	3.80%	3.91%	3.49%	3.09%	1.54%	2.15%
4)	22.09%	34.61%	25.40%	22.77%	6.39%	8.30%	9.21%	11.26%
5)	6.39%	34.76%	54.93%	48.83%	- -	- -	- -	- -
TOT	77.31%	85.01%	87.34%	83.23%	22.68%	14.99%	12.65%	16.77%

Source: SUDENE Reports. Calculations by the author.

Note: range of investment classes is different than that used in preceding tables. The top and bottom classes are the same as in previous tables; top 5) top 4 quintiles, bottom 1) 0.04

lowest quintile, 2) 0.08 quintile, 3) 0.08 quintile, 4) 0.8 quintile.

with fewer small projects locating in both the RMA and elsewhere in Pernambuco, the concentration of investment, 34/18 investment, and jobs in a small number of projects increased even further. This can be seen more clearly if we look at number of projects, jobs, investment, and 34/18 investment as a share of the total for all of Pernambuco by area, by size of investment.

As table 12 and figure 6 show, in the second period 6.39% of the projects received 54.93% of the total investment, 48.83% of the 34/18 investment, and created 34.76% of the jobs; in the first period 3.6% of the projects had received 38.90% of the investment, 23.64% of the 34/18 investment, and had created 5.62% of the jobs. In the bottom class, in the 1969-1974 period, 29.07% of the projects received 0.61% of the investment, 4.81% of the 34/18 investment and created a mere 1.36% of the jobs; whereas in the previous period 37.55% of the projects were in the bottom class and received 2.14% of the investment, 7.78% of the 34/18 investment, and created 26.37% of the jobs!

In absolute terms as shown in the following table this is also true, which means that in the 1969-1974 period less jobs were created at a greater cost.

Table 12 and figure 6 also show that during the first period, both in the RMA as well as outside of the RMA, large projects created little employment while small projects received little capital. Thus, in the first period, in the RMA, the smallest projects created

Distribution of Projects, Jobs, and Investment, by Area, by Period,
Absolute Figures, 1960-1974.

	In the Recife M A		Out of the Recife M A	
	1960-69	1969-74	1960-69	1969-74
Projects	208	133	45	39
Jobs	38,242	18,370	5,502	3,240
Investment	75,048	85,641	8,072	12,408
34/18	31,518	35,230	4,031	7,099

Source: SUDENE Reports, Calculations by the author.

Note: Projects and Jobs in units, Investment and 34/18 Investment in millions of 1981 cruzeiros.

26.37% of the employment with 2.14% of the total investment, and out of the RMA, the smallest projects created 4.99% of the employment with 0.68% of the total investment. In the first period, in the RMA, the projects in the top two classes, created 43.82% of the employment with 76.1% of the total investment, while out of the RMA the projects in the top two classes created 3.85% of the employment with 6.62% of the total investment. In the second period, the situation was less clear cut. Although as in the first one, a limited number of projects concentrated a large portion of employment and especially of investment, in the second period the factor mix tended to be similar irrespective of the size of the project.

5.2.2.3 Capital/Employment Ratio

As described earlier, in March 1969 changes were made to the 34/18 system. One of the changes made was to favor labor intensive projects. Hence we have chosen to measure employment creation by comparing the ratios investment/job and 34-18 investment/job before and after March 1969. In the first period, as table 13 shows larger projects tended to create less employment per unit of investment than smaller ones. Thus, the ratios investment/number of jobs and 34-18 investment/number of jobs increase as the size of the projects increases. This is true both for projects inside the RMA as well as for projects outside of the RMA.

Thus, in the first period, for class "1", the ratios investment/job and 34-18/job were under 300 thousand cruzeiros for the projects locating either in or out of the RMA; while in the same period, the projects classified in class "8" and locating in the RMA recorded ratios of 13,143 thousand cruzeiros per job and 3,416 thousand cruzeiros per job for investment and 34/18 investment respectively (table 13). In the second period, however, except for the projects in the top two investment classes, the factor mix (investment/job) was similar for all investment classes, although much more capital intensive than in the first one. This increase in capital intensity was especially marked for the medium and smaller projects.

As table 15 shows the jobs created during the 1969-74 period were more than twice as expensive as those created in 1960-69 period. Thus, each job cost an average 1,900 thousand cruzeiros in the first period but 4,537 thousand cruzeiros in the second--that is,

TABLE 13

Factor Mix by Location in SUDENE Projects Approved in the First Period, 1960-69(March)

	In the Recife M A investment/job 34-18/job	Out of the Recife M A investment/job 34-18/job
1 *	154	240
2	1,133	559
3	1,000	401
4	3,384	1,832
5	2,047	806
6	1,418	840
7	3,133	1,276
8	13,143	3,416
TOTAL	1,962	824
Total w/o class 8	1,194	646

Source: SUDENE Reports, calculations by the author.

* Note: for range of investment classes see table
 " - " means no projects fell in that class.
 " . " means project(s) falling in that class did not receive
 34/18 funds. In thousands of 1981 cruzeiros.

more than twice as expensive. At the same time, the number of jobs created per project decreased from 173 to 126, while the investment/project went from 328,539 thousand to 570,048 thousand cruzeiros.

TABLE 14

Factor Mix by Location in SUDENE Projects Approved in the Second Period, 1969(April)-1974

	In the Recife M A		Out of the Recife M A	
	investment/jobs	34-18/jobs	investment/jobs	34-18/jobs
1 *	2,048	6,928	941	2,621
2	1,939	898	2,186	1,236
3	2,822	1,409	3,076	2,290
4	1,873	768	2,253	1,472
5	1,997	1,235	2,343	938
6	2,422	995	2,782	1,242
7	5,354	1,944	11,521	6,736
8	7,170	2,752	-	-
TOTAL	4,662	1,918	3,829	2,191
Total without class 8	2,926	1,340	-	-

Source: SUDENE Reports, calculations by the author.

* Note: for range of investment classes see table .

" - " means no projects fell in that class.

" . " means project(s) falling in that class did not receive 34/18 funds. In thousands of 1981 cruzeiros.

5.2.2.4 Conclusions

In this section we set out to test the hypothesis that the March 1969 changes in the 34/18 system of incentives, specifically as they relate to the location of projects and the creation of employment, resulted in actual changes. Findings may be summarized as

TABLE 15

Characteristics of the SUDENE Projects Locating in Pernambuco,
1960-1974, by Period

	First Period 1960-1969(March)	Second Period 1969(April)-1974
Jobs/Project	173	126
Investment/Project	328,539	570,048
Investment/Job	1,900	4,537
34/18 /Job	813	1,958

Source: SUDENE Reports, calculations by the author

Note: investment data in thousand of 1981 cruzeiros.

follows: although after March 1969 projects continued to locate to a large extent in the Recife Metropolitan Area, the share of the municipalities outside of the RMA increased by around 4% with respect to the period prior to March 1969. We chose four indicators to measure change: number of projects, number of jobs, total investment, and 34/18 investment. The largest increase in the share of these indicators by the municipalities out of the RMA was for 34/18 investment (5.43%); since SUDENE controlled the amount of 34/18 funds to be granted to a project this might suggest SUDENE indeed favored those projects out of the RMA (see chapter II). This becomes even more relevant when we notice that after March 1969, though the municipalities out of the RMA received 12.65% of the total investment they received 16.77% of the 34/18 investment, while the RMA received 87.34% of the total investment but 83.23% of the

34/18 investment. This can also be seen in a different way, by comparing the ratios of 34/18 investment/total investment for the two periods as shown in table 16 .

TABLE 16

Pernambuco, Ratios of 34-18 Investment/Total Investment by Location and Period

	A First Period 1960-1969(March)	B Second Period 1969(April)-1974	Difference A - B
In the Recife M A	0.419	0.411	-0.008
Out of Recife M A	0.499	0.572	+0.073

Source: SUDENE Reports, calculations by the author.

So we may assert that to some extent SUDENE succeeded in directing a larger share of projects to areas outside of the RMA in the second period by funding a larger portion of the total investment of those projects locating out of the RMA. As we can see in table 16, the portion funded by SUDENE through the 34/18 system increased from 49.9% in the first period to 57.2% in the second for projects out of the RMA--an increase of 7.3%. Although there was an increase, this was not very significant. For projects locating in the RMA, the portion of the total investment funded by SUDENE remained at around 41% in both periods.

As for employment creation, it is clear that the March 1969 changes in the 34/18 system did not result in greater employment creation both in absolute terms and per unit of investment. In fact, the opposite was true. On the average, projects locating in Pernambuco after March 1969 were more than twice as capital intensive as those locating there up to March 1969. With around 19% more 34/18 funds and 18% more total investment the projects being undertaken in the second period resulted in 50% less employment. In the second period, the number of projects was more than one third less than in the first one. Moreover, projects tended to be larger, even in the municipalities out of the RMA. As a result the investment/job and the 34-18 investment/job ratios increased sharply.

Summarizing then, though some dispersion of industry occurred, this dispersion was not very great, and if seen on the scale of the State of Pernambuco, it may even be insignificant. An expected larger employment creation did not occur; in fact projects were more than twice as capital intensive as a result of a 20% increase in capital but a 50% decrease in the number of jobs created. These findings lead us to reject hypotheses 3a, 3bi, and 3bii for none of the criteria of success were met.

The fact that only a small number of projects located outside of the RMA, both before and after March 1969, may be connected to a perception of those areas as high-risk areas, something we will discuss in the next section. As for employment creation, the dramatic increase in capital intensity registered in the latter period is directly related to the further reduction in the cost of capital after March 1969. Thus, although the March 1969 changes in the 34/18 sys-

tem had provisions that could favor labor intensive projects, they also had provisions reducing the cost of capital. In the end, entrepreneurs chose to favor a capital intensive factor mix.

5.2.3 The Location of Industry: the Overall Effects of SUDENE-Supported Projects

TABLE 17

Spearman Correlation Coefficients, Industrial Employment by Municipalities in Pernambuco, 1940-75

1940/50	1950/60	1960/70	1970/75
0.847	0.884	0.856	0.939
(0.0001)	(0.0001)	(0.0001)	(0.0001)

Source: Censo Industrial, 1940, 1950, 1960, 1970, 1975. Calculated by the author using "standard municipalities" (see Appendix)
 Note: significance in parentheses

In chapter three we hypothesized that "Firms receiving incentives from SUDENE, by locating significant number of projects away from the RMA have increased the share of industrial activity of non-metropolitan areas in Pernambuco during the period 1960-1975." In light of the findings of the preceding section this hypothesis has to be rejected (also see table 18), however, the rejection of this hypothesis in conjunction with the data in table 18 raises other questions which have to be answered. We know that SUDENE projects

TABLE 18

Relative Share of the Recife Metropolitan Area in the Pernambucan Industry, 1940-75

	1940	1950	1960	1970	1975
Employment	56.92%	61.16%	59.29%	60.21%	60.93%
Value Added	NA	NA	66.50%	72.52%	66.79%
Salaries	63.25%	67.21%	69.43%	71.22%	68.40%

Source: Censo Industrial, 1940, 1950, 1960, 1970, 1975.

located mainly in the Recife Metropolitan Area (RMA) and not outside of the RMA either before or after 1969 although a greater number of projects--as measured by employment, investment, and 34/18 investment--located out of the RMA after 1969; the share of industrial employment of the RMA vis-a-vis the rest of Pernambuco remained about the same from 1950 through 1975 at around 60%; moreover, a Spearman rank-order correlation test showed that, at the level of the State and using 79 standardized municipal units, no major spatial shifts of industrial employment took place either between 1960 and 1970 or between 1970 and 1975 (see table 17); the share of value added of the RMA vis-a-vis the rest of Pernambuco increased from 1960 to 1970 but went down from 1970 to 1975, as did salaries (see tables 17 and 18).

5.2.3.1 The Risk of Locating out of the Recife Metropolitan Area

We have seen that according to the Industrial Censuses industrial employment in the RMA has remained around 60% of the total industrial employment for Pernambuco. However, the ~~projects~~ approved in Pernambuco by SUDENE between 1960 and 1974, which were in operation as of 1975, created 86.62% of the employment in the RMA. These figures and the preceding discussion leads us to ask two questions: first, why were 86.62% of the jobs to be created in the RMA while the share of employment of the RMA--according to the Censuses--was only 60% ?

A second question is how industry located outside of the RMA managed to keep its share of the total employment and to recuperate, by 1975, the share of value added lost during the 1960-1970 period, despite little help from SUDENE? If the little willingness shown by entrepreneurs to locate in areas outside of the RMA was founded on a perception of those areas as high risk areas, the perception was well founded.

As we can see in table 19, locating out of the RMA was much riskier than locating in the RMA. Of the total number of projects not functioning as of 1975, 32.46% were out of the RMA, although only 19.77% of those functioning as of 1975 were in this same area. If we look at other indicators such as employment or investment, the riskiness of areas outside of the RMA becomes even more clear. Thus, 38.90% of the projected employment in projects not functioning as of 1975 were to be created in municipalities outside of the RMA; while only 13.38% of the projected employment in projects function-

TABLE 19

Pernambuco, Share of Functioning and Non-Functioning SUDENE Projects
by Location

	In the Recife M A		Out of the Recife M A	
	Funct'ing	Non-Funct'ing	Funct'ing	Non-Funct'ing
N. of Projects	80.23%	67.54%	19.77%	32.46%
Employment	86.62%	61.10%	13.38%	38.90%
Investment	88.69%	67.32%	11.31%	32.68%
34/18 Inv.	85.71%	60.96%	14.29%	39.04%

Source: SUDENE Reports, calculations by the author.

Note: Functioning and Non-Functioning are independent data sets; Non-Functioning in the RMA plus Non-Functioning out of the RMA gives one 100%. The date of reference is 1975. Non-Functioning refers to projects which were either out of business or had never been undertaken as of 1975 (see Section 5.2.1.2).

ing as of 1975 were to be created in these municipalities. For total and 34/18 investment the figures were 32.68% and 11.31%, and 39.04% and 14.29%. Although these figures show clearly that risks were higher out of the RMA than in the RMA, industries located out of the RMA created a great deal more employment independently of SUDENE's incentives.

If we look at table 20 we can see that the net employment created at SUDENE projects located in the RMA was 37,699 (that is excluding the existing employment and the employment not yet created); the absolute employment growth recorded by the censuses for the same

TABLE 20

Pernambuco, Employment Creation by Location

	In the RMA	Out of the RMA	Source
A Absolute Intercensal Difference 1960-1975	26,964	15,339	Censuses
B Projected Employment	56,612	8,742	SUDENE
C Net Employment	37,699	7,433	Gov. of Pernam buco
D A-C	-10,735	+7,906	

Source: A Censo Industrial, 1960, 1975.
 B SUDENE Reports
 C Pernambuco Industrial (Pernambuco, 1974)

Note: Projects not functioning as of 1975 were excluded.

period was 26,964. This means that there must have been a loss of 10,735 jobs in establishments not receiving funds from SUDENE or in establishments modernized with the use of SUDENE funds in the RMA. However, the opposite was true for industry locating out of the RMA. Although the net employment created in SUDENE-assisted projects located outside of the RMA amounted to only 7,433, the absolute employment growth recorded by the Censuses was 15,339. This means that 7,906 jobs were created in establishments located outside of the RMA, without SUDENE's funds.

The comparison between the employment growth recorded by the Censuses and the net employment created at SUDENE-assisted projects can be seen in more detail in the context of regression analysis.

5.2.3.2 A Comparison of the Net Employment Created by SUDENE-Assisted Projects and the Employment Recorded by the Censuses

A regression analysis of the industrial employment growth between 1960 and 1975 against the net employment created by SUDENE during this same period shows where the jobs were created and lost over and under the jobs created at SUDENE-assisted projects.

Industrial employment growth by municipality is predicted from the net employment created by SUDENE. So, "y", our dependent variable, is made up of 79 cases (the 79 standard municipalities of Pernambuco, see appendix). The values for "y" are calculated by subtracting industrial employment in 1960 from industrial employment in 1975. The independent variable, "x", is the net employment created at SUDENE-assisted projects by municipality.

The regression of "y" (industrial employment growth by municipality, 1960-75) on "x" (net employment created by SUDENE by municipality, 1960-74), gives us an r square of 0.7899. This means that almost 80% of the industrial employment growth by municipality in Pernambuco between 1960 and 1975 can be "explained" by the net employment created by SUDENE during the same period. However, the remaining 20% of the industrial employment growth between 1960 and 1975 remains unaccounted for by the model. That is, there are municipalities for which the predicted industrial employment (according to the net employment created at SUDENE-assisted projects) was higher or lower than the actual industrial employment increase recorded by the Censuses. The analysis of the divergences between predicted and actual values is called analysis of residuals.

5

An examination of residuals shows that most of the extreme negative residuals correspond to municipalities in the RMA and the Mata Umida. This is a result of two different processes: the closure or reduction of operations at some firms in some municipalities in the RMA, despite, or due to the establishment or modernization of SU-DENE-assisted industries, and the reduction of employment in industries processing sugar cane in the Mata Umida. Within the RMA, the negative residuals recorded for the municipalities of Moreno and Paulista are linked to the modernization of textile industries--especially the textile subsector of weaving and spinning (see section 5.2.4.3)--while the negative residuals recorded for Cabo and Igarassu reflect a decline or closure of firms in modern and traditional sectors."

Eleven municipalities recorded extreme positive residuals (more than +500). Out of these, two were located in the RMA--Recife and Jaboatao; while five were located immediately adjacent to the RMA. The extreme positive residuals recorded by five of the municipalities immediately adjacent to the RMA may be associated with a "spill-over" effect from the RMA. Out of the remaining four municipalities recording extreme positive residuals three were located in the Agreste and one in the Sertao. Unfortunately, it is very difficult if not impossible to determine precisely what type of industries lo-

" Melo says that (with respect to the PEA, Economically Active Population, between 1950 and 1970) "In Paulista and Moreno, where negative rates were recorded, the small decrease is certainly linked to the modernization of the textile establishments located in those municipalities." Melo also points out that a decrease in the participation of the population in the PEA was also more marked for Paulista and Moreno, "Certainly the effect of the....industrial modernization." (Melo, 1978:212, also 219)

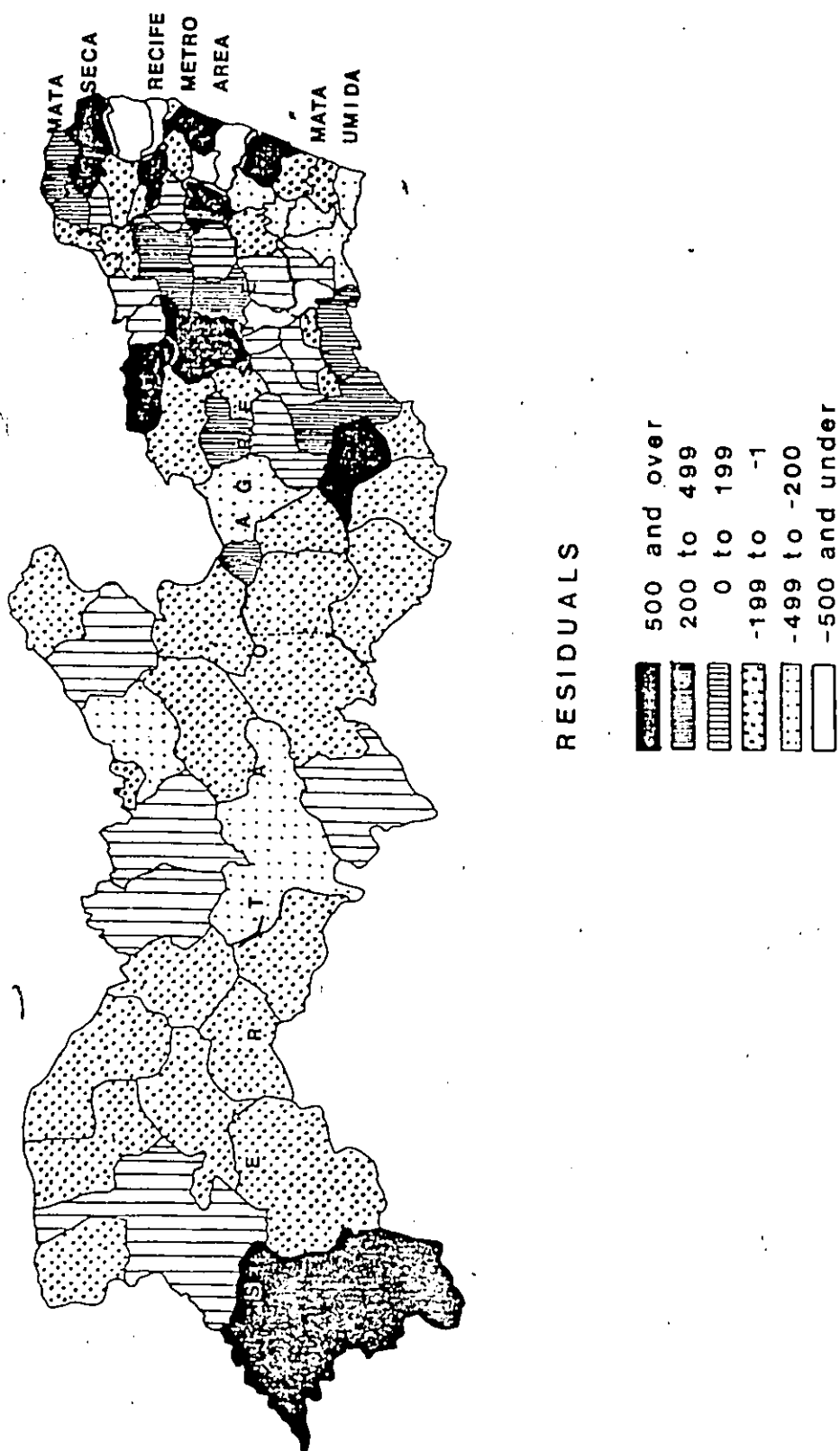


Figure 7: The Spatial Impact of SUDENF-assisted Projects on Industrial Employment in Pernambuco: A Map of Residuals

cated or grew in the municipalities outside the RMA during the 1960-75 period because the 1960 Industrial Census does not provide employment data by municipality, by sector. Furthermore, confidentiality provisions obscure the Census data by municipality for 1970 and 1975 especially for municipalities with a small industrial base.

Because most SUDENE-supported industrial projects have located in the RMA both before and after March 1969, it is within the RMA where most changes have taken place during the 1960-75 period. As for employment, losses in traditional industries located mostly in the municipalities of Paulista and Moreno have been balanced by larger gains in employment in modern industries locating mostly in Jaboatao and Recife. Both the modernization of existing industries and the implantation of new ones have undoubtedly rejuvenated the industrial establishments in the RMA.⁴⁰ This has not happened in the rest of Pernambuco with the exception of some establishments in some sectors. Thus, although the share of employment and value added has remained at around the same levels for both regions (the RMA and the rest of Pernambuco), throughout the 1950-75 period, there has been a qualitative change--the technological gap between the industrial establishments in the RMA and those elsewhere in Pernambuco has most probably widen, at least for some sectors.

⁴⁰ It is in the RMA "more than in any other [area of the Northeast], where the modernization and re-equipment of industrial establishments existing before SUDENE [has taken place]" (Pinto and Une, 1977:356).

5.2.3.3 The Location of New Industry: A Summary

Although the March 1969 changes in the 34/18 system favored, on paper, the location of projects in areas outside of the RMA, SUDENE was only marginally successful in promoting industrial development in these areas after March 1969, and the bulk of projects continued to locate in the RMA. The small success of SUDENE in directing new industrial ventures to areas outside of the RMA may be due to a greater risk associated with a peripheral location; a risk, which, as was shown through an examination of non-functioning projects, is markedly higher in areas outside of the RMA. This risk, however, did not deter a number of entrepreneurs from creating an important number of industrial jobs in areas outside of the RMA without the financial aid of SUDENE. This would suggest that despite much declared willingness on the part of SUDENE to promote industrial development in the interior of Pernambuco, a number of entrepreneurs implemented industrial projects in the interior of the State without SUDENE's assistance. More importantly, they carried out these projects despite the seemingly greater riskiness. Using regression analysis it was shown that most of the employment created out of the RMA without the direct financial aid of SUDENE was created in municipalities immediately adjacent to the RMA, in municipalities of the Mata Seca, and in municipalities of the Agreste. The combination of the factors outlined above explains how, despite large industrial investments in the RMA during the 1960-75 period, the municipalities of the interior of Pernambuco have maintained their share of the total industrial employment of the state.

SUDENE-assisted projects were an important vector of change responsible for creating employment not only in certain locations, but also in certain sectors. Thus, SUDENE-assisted projects were more concentrated in certain sectors than in others. The impact of these projects on the existing industrial structure is the subject of the next section.

5.2.4 The Resulting Industrial Structure

5.2.4.1 The Pre-Existing Industrial Structure

The Prominence of Textiles and Food Products in the Industrial Structure of Pernambuco: Up to 1960, Pernambuco had a traditional industrial structure composed mainly of textiles and food products (see table 21). Most of the activity in these two sectors was tied to the transformation of two locally produced agricultural products: cotton and sugar cane.⁴¹ Cotton and sugar cane had been an important driving force behind the economic development of Pernambuco and most of the rest of the Northeast since colonial times. The production of cotton and sugar cane was tied to markets outside the Northeast--in Southern Brazil and especially abroad--and hence mostly outside of the sphere of influence of Pernambucan and Northeastern producers. As a result of growth and decline, ups and downs in these industries followed the demand generated outside of the region. As a producer of sugar, however, Pernambuco probably started declining as early as after 1654, time of the expulsion of the Dutch from North-

⁴¹ There are a number of studies treating these topics, see for example Andrade, 1981; Eisenberg, 1974; Stein, 1955; Taylor, 1978; Wythe, 1955.

eastern Brazil. Nonetheless, within Brazil, Pernambuco continued to be until the present a major sugar producer. In 1980, for instance, Pernambuco contributed 46% of the sugar production of the Northeast; in turn, the Northeast as a whole contributed 40% of the total Brazilian production. In recent years part of the sugar cane production has been used to produce alcohol of which Pernambuco produced about half of the national total as of 1980 (Andrade, 1981:ch 6).

TABLE 21

The Industrial Structure of Pernambuco, 1940-1960

	1940		1950		1960	
	Empl. %	Prod. %	Empl. %	Prod. %	Empl. %	Prod. %
Textiles	38.57%	28.86%	39.90%	30.21%	29.70%	19.37%
Cotton Prods.	NA	NA	33.22%	25.54%	NA	NA
Food	42.84%	52.70%	34.42%	47.20%	36.90%	44.67%
Sugar Prods.	NA	NA	22.57%	25.71%	20.94%	22.79%
Rest of Traditional	10.39%	8.98%	13.14%	10.95%	15.15%	11.88%
Dynamic	7.18%	9.08%	12.24%	11.57%	17.72%	23.93%
Mining	1.02%	0.38%	0.30%	0.06%	0.53%	0.14%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Censo Industrial, 1940, 1950, 1960.

Note: Empl.: employment
Prod.: value of production

The production of cotton in Pernambuco started at the time of the Industrial Revolution, in England. The transformation of cotton into textiles, however, only started in the late 1800's and received great impetus with the two World Wars.⁴²

The production of cotton and sugar cane and the transformation of these materials into textiles and sugar were greatly affected not only by events occurring outside of Brazil but also by the competition of producers in Southern Brazil. Especially in the case of textiles, this competition became evident after the Second World War when due to improved transportation regional markets became a unified national market.

Because of the prime importance of textiles and food products in the industrial sector of Pernambuco, their decline carried the relative, and, in some cases the absolute decline of the whole Pernambucan industry vis-a-vis the rest of Brazil, as we saw at the beginning of this chapter. In Pernambuco, parallel to the relative and absolute decline of the textiles and food products sectors, the modern industrial sectors, and some of the other traditional sectors had shown from the 1940's onwards some possibility of growth (see table 21 and the first section of this chapter). It is then, within this general framework that SUDENE designed its industrial policies.

The Two Main Lines of SUDENE's Industrial Policies: In 1959, the GTDN, a group of researchers headed by Celso Furtado, sketched the main lines of the industrial policy that was to be followed by SUDENE, with only minor changes, for more than two decades. The re-

⁴² Note in table 21 the relative increase of textiles between 1940 and 1950, while the relative share of food products declined.

port drafted by the GTDN called for the promotion of four types of industry: steel production, machinery, industries transforming local raw materials, and traditional industries (especially textiles) (GTDN, 1959:331-333). The rationale behind the promotion of these industries was as follows: the local production of steel and iron at competitive prices vis-a-vis Southern production would induce the establishment of industries producing basic tools and equipment for which the demand had been fulfilled by Southern production. The transformation of local raw materials such as sisal fiber, cement, phosphates (for the production of fertilizers) would also result in import substitution and possibly export. Finally, the GTDN Report pointed that textile industries were badly in need of help if they were to survive competition from the Center-South. Furthermore, it claimed that "taking into consideration the conditions the Northeast has for the production of cotton (of long and short fiber), the price and availability of energy, and the relative cost of labor, it is totally unjustifiable from an economic point of view that the textile industry of the Northeast disappear to the benefit of that of the South." (GTDN, 1959:333; emph. added)

This emphasis on the development of steel and machinery industries was extended to other modern sectors (chemicals, paper, rubber, etc.) in the development plans and the regulations governing the 34/18 system (see chapter 2). The emphasis on an upgrading of the textile industry and the processing of local raw materials also continued throughout the 1960's and the first part of the 1970's. In this section we will evaluate whether SUDENE's industrial poli-

cies contributed to the attainment of the above mentioned objectives by examining the structure of the industrial projects receiving incentives from SUDENE throughout the 1960-1974 period. Industrial structure is defined in terms of the two digit industrial classification of 1970. The weight of each industrial branch will be measured in terms of four indicators: number of projects, employment, total investment, and 34/18 investment.

5.2.4.2 The Industrial Sectors Favored by the SUDENE-Assisted Projects

As table 22 shows, the structure of the projects approved by SUDENE from 1960 through 1974 reflected to a large extent the aims of SUDENE's policies: upgrading and development of traditional and modern sectors, respectively. By far, textiles received the largest share of projects, jobs, investment, and 34/18 investment, followed by metallurgy, chemicals, electrical and communications equipment, and non-metallic minerals.⁴³ Although receiving a relatively small share of 34/18 investment (4.6% and 2.31%), the food products and clothing sectors created a relatively large number of jobs (9.3% and 9.41% of the total, respectively). The paper products sector presented a completely opposite example: it created only 2.61% of the total employment though it received 9.84% of the investment.

Although the structure of the projects approved by SUDENE shows the Agency was successful in directing industrial development towards the upgrading of traditional industrial sectors and the devel-

⁴³ The percentages in the table were calculated using corrected SUDENE figures, that is, projects which were not undertaken or had closed down were excluded (see chapter 5.2).

TABLE 22

Share of the Industrial Projects Approved by SUDENE in Pernambuco,
1960-74

Code	Sector	N of Projects	Jobs (Corrected)	Investment	34/18 Investment
24	Textiles	18.48%	34.18%	31.83%	27.45%
11	Metallurgy	10.85%	8.70%	15.39%	16.68%
20	Chemicals	11.32%	5.07%	12.79%	6.53%
13	Electr Comm	9.47%	10.86%	8.41%	7.67%
10	Non-Metallic	10.62%	6.66%	6.98%	8.62%
14	Transport	2.08%	2.41%	4.31%	4.82%
17	Paper Prods.	5.54%	2.61%	3.82%	9.84%
27	Beverages	1.62%	2.95%	3.21%	1.61%
26	Food Prods.	8.78%	9.30%	3.07%	4.60%
12	Machinery	4.16%	2.46%	2.50%	3.37%
25	Clothing	3.93%	9.41%	2.36%	2.31%
15	Wood Prods.	0.46%	0.19%	1.68%	2.08%
23	Plastics	3.93%	1.93%	1.38%	1.60%
		====	====	====	====
	TOTAL	91.24%	96.73%	97.73%	97.18%

Source: SUDENE Reports, calculations by the author

Note: we have excluded those sectors receiving less than 1% of the total investment. Projects not functioning as of 1975 are excluded.

opment of modern ones, this evidence is not enough to conclude the Agency was or was not successful in changing the industrial struc-

ture while at the same time upgrading traditional industrial sectors. We need to know what happened in the whole industrial sector of Pernambuco between 1960 and 1974, and the best source for this information is the industrial censuses. By comparing corrected and net employment data of the SUDENE-assisted projects with Census data by industrial sector (mining, textiles, etc.) we can find out in what sectors SUDENE was more successful.

5.2.4.3 SUDENE's Impact on Changing the Industrial Structure: Success or Failure?

As we can see in table 23, generally speaking projects in modern sectors were more successful than projects in traditional sectors in creating employment. In modern industrial sectors, the net employment created was reasonably close to the projected employment. For instance, if we consider four key dynamic sectors together, such as Metallurgy, Machinery, Electric and Communications Equipment, and Transport Equipment, we can see that projected employment matches net and recorded employment.⁴⁴ Moreover, the censuses record a larger increase in employment in these sectors during the 1960-1975 period than that increase due to SUDENE-assisted projects. This may suggest a spillover effect on firms not receiving funds from SUDENE. However, projects in the traditional sectors have not been very successful in creating as many jobs as projected. Among the traditional sectors, the best example is the textile sector for it received a large portion of the total investment, and of the 34/18 investment, but as a whole and according to the Industrial Censuses the sector

⁴⁴ Most of the projects were implantation projects, i.e. new plants.

did not even succeed in keeping the employment levels of 1960. However, the poor performance of some sectors, such as textiles, may be somehow overstated due to problems of comparability. A direct quantitative comparison by sector between Census data and the other data presented in table 23 is only possible after some allowances are made, for there are differences in the definition of establishment between Censuses and the other sources.⁴⁵ For there are differences in the definition of establishment between Censuses and the other sources used in table 23.

This difference in definition inflates the non-Census data for they include jobs in units of production corresponding to other sectors related to textiles, such as chemicals, cosmetics, pharmaceutical, food products, etc. In other words, at some plants, textile firms produce other goods, besides textiles. The people producing these non-textile goods are counted as textile workers in the non-Census sources. Thus, if we count the total number of people working in the textile sector according to the Cadastro Industrial 1975, we get 20,660 people (even after we omit a few firms clearly belonging to the clothing sector), whereas the Census for that same year recorded 15,747 people working in textiles.

The figures in table 23 and the remarks we have made show that the success of SUDENE was partial. That is, despite the fact that SUDENE invested a great deal of effort and funds in the textile sector, the sector did not create as many jobs as projected. The oppo-

⁴⁵ Industrial Censuses define an establishment as a unit of production of a specific product, whereas the other sources used in table 23 define an establishment as a plant. Then within one plant there may be more than one unit of production (see Appendix A)

TABLE 23

Employment Indicators by Sector, SUDENE Projects Approved in
Pernambuco, 1960-1974

	A Corrected	B Censuses	B-A	C Net	D Recorded
Non-metallic	4,353	6,482	2,129	3,621	5,112
Metallurgy	5,687	5,269	-418	4,920	7,232
Machinery	1,608	8,268	6,660	1,642	1,739
* Electrical Equ.	7,098	3,895	-3,203	7,821	5,424
Transport	1,575	2,086	511	1,438	1,201
Wood	124	1,647	1,523	150	196
Furniture	534	1,915	1,381	367	414
Paper	1,706	561	-1,145	1,215	2,226
Rubber	254	552	298	211	355
Leather	336	-87	-423	541	606
Chemical	3,314	1,446	-1,868	3,006	3,673
Plastics	1,261	1,763	502	744	912
Textiles	22,342	-5,657	-27,999	9,269	17,142
Clothing	6,151	3,972	-2,179	4,165	3,856
Food Prods.	6,079	4,595	-1484	4,040	7,628
Beverages	1,928	177	-1,751	1,160	1,914
Printing	378	1,442	1,064	256	349
Others **	626	1,910	1,284	566	541

Source: A SUDENE Reports see chapter 5.2, B Censo Industrial 1960, 1975; C Pernambuco Industrial 1974; D Cadastro Industrial 1975.

Note: Projects not functioning as of 1975 were excluded.

** includes Others, Mining, Pharmaceutical, Perfume, Tobacco.

site picture is exemplified by some of the dynamic sectors. Although it is beyond the scope of this thesis to account for the difference in performance of modern vis-a-vis traditional sectors, in order to evaluate the actual effect of SUDENE's industrial program it is important we account for what looks at first glance as a paradox: textiles, the sector that received the most help, was the one which performed most poorly.

The Case of the Textiles Sector: As we saw above, the textiles sector has received about one third of the total investment, over one quarter of the total 34/18 investment, and was to create over one third of the total number of jobs. Despite all these efforts this is the sector that has performed the worst during the period 1960-1974. The rates of growth of employment for the textile sector of Pernambuco have been the lowest of all sectors when compared against the rates of growth for employment in the same sectors for Brazil as a whole (see section 5.1). Industrial employment in the textile sector of Pernambuco fell in absolute terms from 21,404 in 1960 to 14,679 in 1970, although it regained some ground by 1975 increasing to 15,747. Still, there was an absolute loss of employment of 5,657 between 1960 and 1975. SUDENE, however, claimed that projects approved by the Agency in the textile sector were to create 22,344 jobs! And this after we excluded those firms which had closed down or were not yet in operation as of 1975 (see section 5.2).

How do we account for this difference?

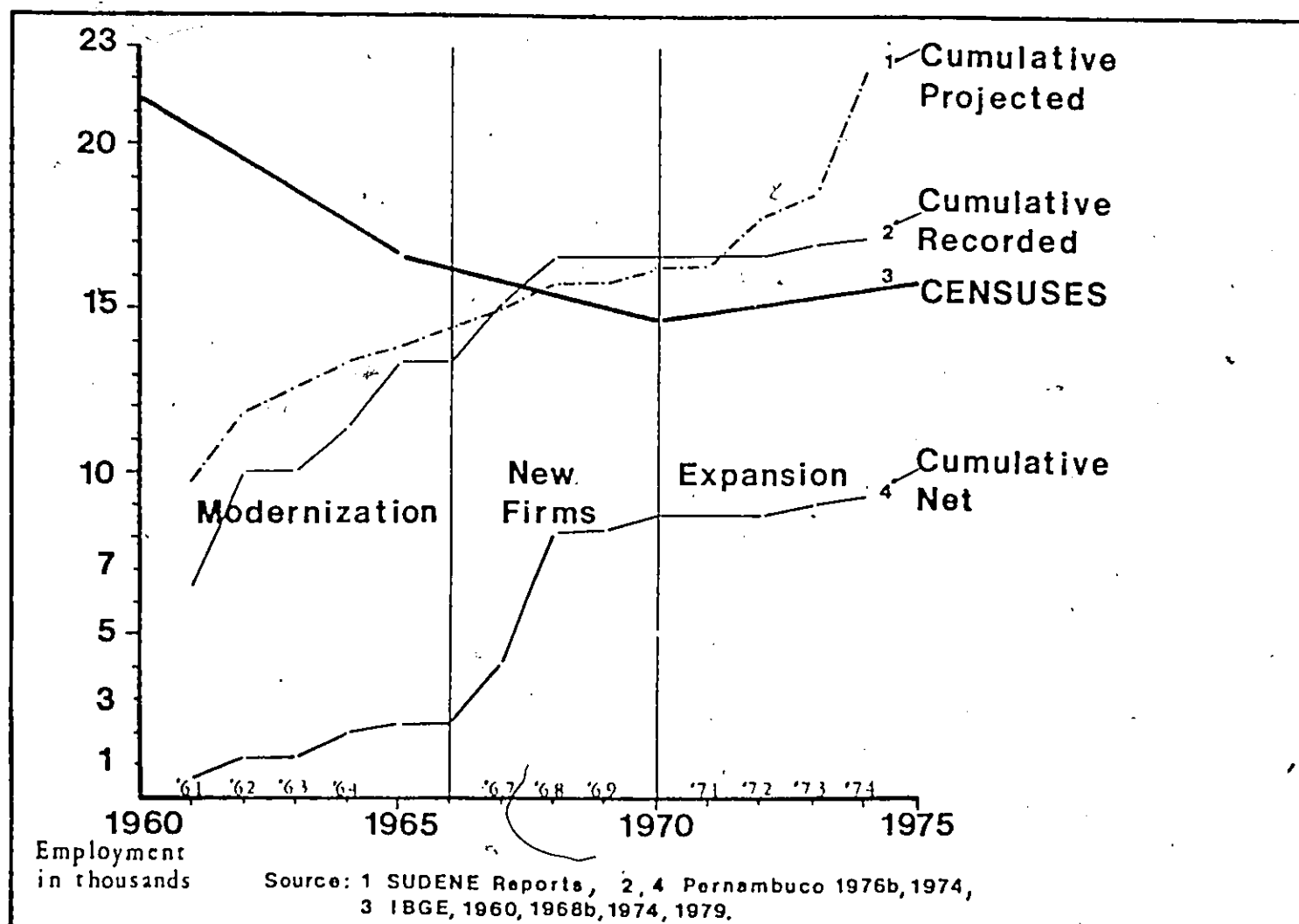


Figure 8: The Evolution of Employment in the Textiles Sector of Pernambuco, 1960-75

First, as we pointed out earlier, a number of jobs were to be created in other sectors, not in textiles. Secondly, the larger textile firms were modernized between 1960 and 1966 and this modernization resulted in either no employment creation or a loss of employment; nonetheless, SUDENE counted the total number of jobs after modernization as net additions.⁴⁴ Thus, between 1960 and 1966 SUDENE approved 31 projects of modernization involving 17 textile firms. The "projected" employment of these firms was 13,836. So since we know that at least this number of jobs existed and were not really created, but were, in the rationale of SUDENE's officials, "saved" from disappearing, we may deduct 13,836 from 22,344--the total projected employment for the textile sector--and we get 8,508. This would be the approximate number of jobs to be created by SUDENE.

Indeed, starting in 1967 SUDENE began approving projects of implantation of new establishments in the textile sector; the implantation and the later expansion of ~~these~~ new establishments were to create 7,482 jobs.⁴⁵ Furthermore, the expansion and relocation of some of the existing establishments were to create an additional 1,026 jobs. However, the Industrial Cadastre of 1975 recorded only 3,231 jobs in the new plants, although in 1974 the net employment

⁴⁴ The rationale of SUDENE's officials was that were it not for modernization all jobs would have been lost. Although this rationale makes some sense, it makes difficult evaluating the net employment impact of the SUDENE-assisted projects. (See section 5.2.1)

⁴⁵ SUDENE approved the implantation of 11 new textile plants from 1967 to 1974. Nine of these were approved between 1967 and 1970. From 1970 to 1974 we have a period in which some of the older plants continued to modernize while the newer ones started to expand. During the 1970-74 period we also find 2 projects of relocation of existing plants.

created at these new plants was estimated at 6,991. So summarizing we have:

A	projected employment at all textile projects	:	22,344
B	existing employment (modernization projects)	:	13,836
C	employment at modernized plants as of 1975	:	13,732
D	difference A - B	:	8,508
E	projected employment at new plants	:	7,482
F	projected employment at plants being expanded	:	1,026
G	recorded employment at new plants	:	3,410
H	net employment created at new plants	:	6,991

Source: A, B, E, F SUDENE; C, G Cadastro Industrial, 1975;
H Pernambuco Industrial, 1974.

Note : F includes relocation projects

This leads us to conclude that 22,344 projected jobs in the textile sector have really resulted in the actual creation of between 3,410 jobs (G) and 6,991 jobs (H) between 1960 and 1975. However, employment in the textile sector went down by 5,657 jobs between 1960 and 1975 according to the Industrial Censuses. So, we have to conclude that the creation of jobs in some firms must have been accompanied by the loss of jobs not only in other firms but in firms which modernized their instalations. This is a point that has also been made by other writers.

Recently, in an unpublished report John Redwood pointed that

It should also be remembered that modernization of the textile industry has involved the destruction of a substantial number of jobs in the region. This should be taken into account in any analysis of the total employment impact of the industrialization effort. (Redwood, 1982:55, emph. added)

Further on he hypothesized:

it is possible that one of the consequences of the increased presence of extra-regional capital in the Northeastern industrial sector has been the takeover or 'destruction' of smaller, more traditional, locally owned manufacturing establishments in certain sectors, especially textiles and food processing. (Redwood, 1982:65 emphasis added)

Although Redwood's study was concerned with the Northeast as a whole, his statements seem also to be applicable to Pernambuco. We estimate that during the 1960-1975 period at least 10,000 textile workers lost their jobs. We arrive at these figures by adding the 5,657 jobs lost in textiles between 1960-1975 according to the Censuses, to the estimated 5,000 jobs actually created at SUDENE-assisted projects in the textile sector.**

What factors may have contributed to this reduction of employment in the textile sector of Pernambuco?

One key factor to which many changes in the sector are associated is the substitution of capital for labor. Thus, the modernization of large plants seems to have been associated with a reduction of employment in these plants. For the Northeast as a whole, according to SUDENE officials the modernization of textile plants may, "in some cases cause the dismissal of 50% of the labor force." (Castro, 1971:220). For Pernambuco we have contradictory information.

** These 5,000 jobs are the midpoint between the two estimates we have: 3,410 and 6,991 (see preceding table).

Castro wrote that 3,726 jobs were lost in the modernization of the textile industry of Pernambuco and that the after-modernization employment at these plants totalled 12,898 (Castro, 1971:196). SUDENE, however, in a report dealing with the textile industry of the Northeast, presented evidence pointing to a small increase in employment. According to this report, in Pernambuco, prior to modernization, the textile plants to be modernized had an employment of 12,107 in 1959; modernization did away with 2,207 jobs but created 2,560 jobs; so the end result in 1969 was 12,460 jobs, or 353 more jobs than in 1959 (SUDENE, 1971:38). In light of the discussion that follows, the SUDENE data are suspect, to say the least.

The first part of the modernization program for the textile sector took place between 1960 and 1965. By the end of 1965 employment in the textile sector had dropped by at least 4,773 jobs from 21,404 in 1960 to 16,631 in 1965.¹³ However, all of the plants modernized during this period were still in existence as of 1975 and their aggregated employment was about the same as the "projected" employment when they were modernized. This may indicate that modernization had a positive effect on those plants modernized for they did not close down nor did they reduce their post-modernization employment levels.

The modernization of some plants and the establishment and later expansion of other new textile plants may have been associated with the closure and/or reduction of employment in other plants not

¹³ We say "at least" because the data for 1965 are from Registro Industrial and include some non-formal industries excluded from the Censuses (IBGE, 1968b:167).

receiving help from SUDENE. The modernization of textile plants continued all throughout the 1960's and the first part of the 1970's, but as we have seen before it was very important only until around 1967. Between 1967 and 1974 we have a period of implantation and expansion of new textile plants. Eleven new textile plants were located in Pernambuco during this period. Their implementation and later expansion may be associated to a reduction of activities in the larger plants. This reduction is reflected in the decrease by half of the number of establishments employing more than 500 people between 1970 and 1975 as shown in table 24. Parallel to this reduction of the number of establishments employing more than 500 people, we have an increase in the number of establishments in the middle categories.⁵⁰

In the textile sector of Pernambuco, the top class (+500 employees) was until 1970 the class that contained more employees. This is also the class that has experienced the most dramatic reduction of employment during the 1950-75 period; it contained 30,265 workers in 1950, but only 4,132 in 1975. Most, if not all, establishments in this class are in the sub-sector of weaving and spinning. It is in this sub-sector that the modernization program concentrated, and also the sector preferred by most of the new firms locating with the help of SUDENE incentives in Pernambuco after 1967.⁵¹ The reduction of employment in weaving and spinning is con-

⁵⁰ A major drawback inhibiting a more detailed and accurate analysis is the 1960 Industrial Census for it does not present a table breaking down employment by sector, by groups of people employed.

⁵¹ Weaving and spinning establishments have traditionally concentrated in coastal areas, mostly in the municipalities of Recife,

nected to the substitution of capital for labor; for it is in this subsector of textiles where most of the inroads in textiles technology have been made (see Vries and Brakel, 1983).⁵² However, it has also been noted that "in spinning and weaving, 'appropriate' (i.e. labor intensive) technology can produce considerably more benefits for LDCs than the most capital-intensive technology in terms of additional output, employment and wage and non-wage income" (Vries and Brakel, 1983:25; after Pack, 1980). This would strongly suggest that at least in terms of the textiles sector, the policies pursued by SUDENE did not displace labor because they aimed to achieve efficiency but rather because these policies had no provisions obliging firms to adopt labor intensive techniques of production.

5.2.4.4 Industrial Diversification: The New Structure

The relative decline of two prominent industrial sectors, textiles and food products, was accompanied by the relative growth of most of the modern sectors (especially machinery) during the 1960-75 period. SUDENE was very successful in creating employment in modern sectors, but not in traditional ones. Thus, the textiles sector received over one quarter of the total 34/18 funds but only created a small portion of the jobs projected. Moreover, it would seem that the modernization of some plants and the establishment and later ex-

Paulista, and Moreno. The relative decline of these municipalities in terms of industrial employment is described in section 5.2.3.

⁵² The fact that the new textile firms locating in Pernambuco under the program of incentives brought with them the most recent technology is documented in "As Empresas que Desenvolvem o Nordeste" in TELEPRESS, 1971.

TABLE 24

Distribution of Textile Establishments by Employment Classes in
Pernambuco, 1950-1975

Classes		1950		1965		1970		1975	
		Estab	Person	Estab	Person	Estab	Person	Estab	Person
1 TO	4	28	121	31	62	2	X	4	12
5 TO	9	29	226	65	455	36	X	53	328
10 TO	19	6	98	50	750	19	258	20	252
20 TO	49	7	140	27	945	14	450	24	690
50 TO	99	7	904	6	450	7	438	21	1,499
100 TO	249			6	1,050	7	1,106	16	2,130
250 TO	499	4	1,688	6	2,250	5	2,001	22	6,377
500 AND +		14	30,265	10	10,669	12	10,025	6	4,132
TOTAL		95	33,442	203	16,631	107	14,449	166	15,420

Source: Censo Industrial, 1950, 1970, 1975; Cadastro Industrial, 1965
Registro Industrial, 1965.

Note: Estab stands for Establishment; Person for Occupied Personnel.
Data for 1970 and 1975 do not include smaller establishments.
Data for 1965 is calculated from the known total for that year
by transforming class interval data (see A.1.3).

pansion of new ones may have resulted in a loss of jobs. The relative decline of traditional sectors and the growth of modern ones have resulted in a change in the structure of industry (taking employment as the indicator). The new industrial structure is thus, more diversified.

Indeed, we have calculated that the "crude industrial diversification index" for Pernambuco, taking employment as the indicator, decreased from 1,957 in 1960 to 1,788 in 1975.⁵³ Meanwhile the "refined industrial diversification index" (that is, in relation to the crude index for Brazil) also decreased from 0.561 to 0.256 between 1960 and 1975. These changes in structure can also be seen in terms of a Lorenz curve. Figure 7 shows that the cumulative employment curve by industrial groups for Pernambuco shifted downwards closer to the curve for Brazil and in the direction of absolute diversification.

A diversification index, however, says nothing about the nature of the change taking place. It only tells us that Pernambuco diversified its industrial composition. A way of determining the nature of change is by using shift-share analysis. Two shift-share components are used to determine the nature of structural change occurring between two time periods in a region. One is industrial mix (IM); the other is proportionality modification shift (PM). The first component accounts for change in structure resulting from the industrial composition at the beginning of the period; while the second accounts for change resulting from the region having modified its industrial composition during the period under consideration. These components, then, display the same reality from two points of view: the industrial structure at the beginning of the period, and the change in industrial structure taking place during the period under study.

⁵³ These indexes were devised by Allan Rodgers in 1957 (Rodgers, 1957; Alexander, 1963:407-10).

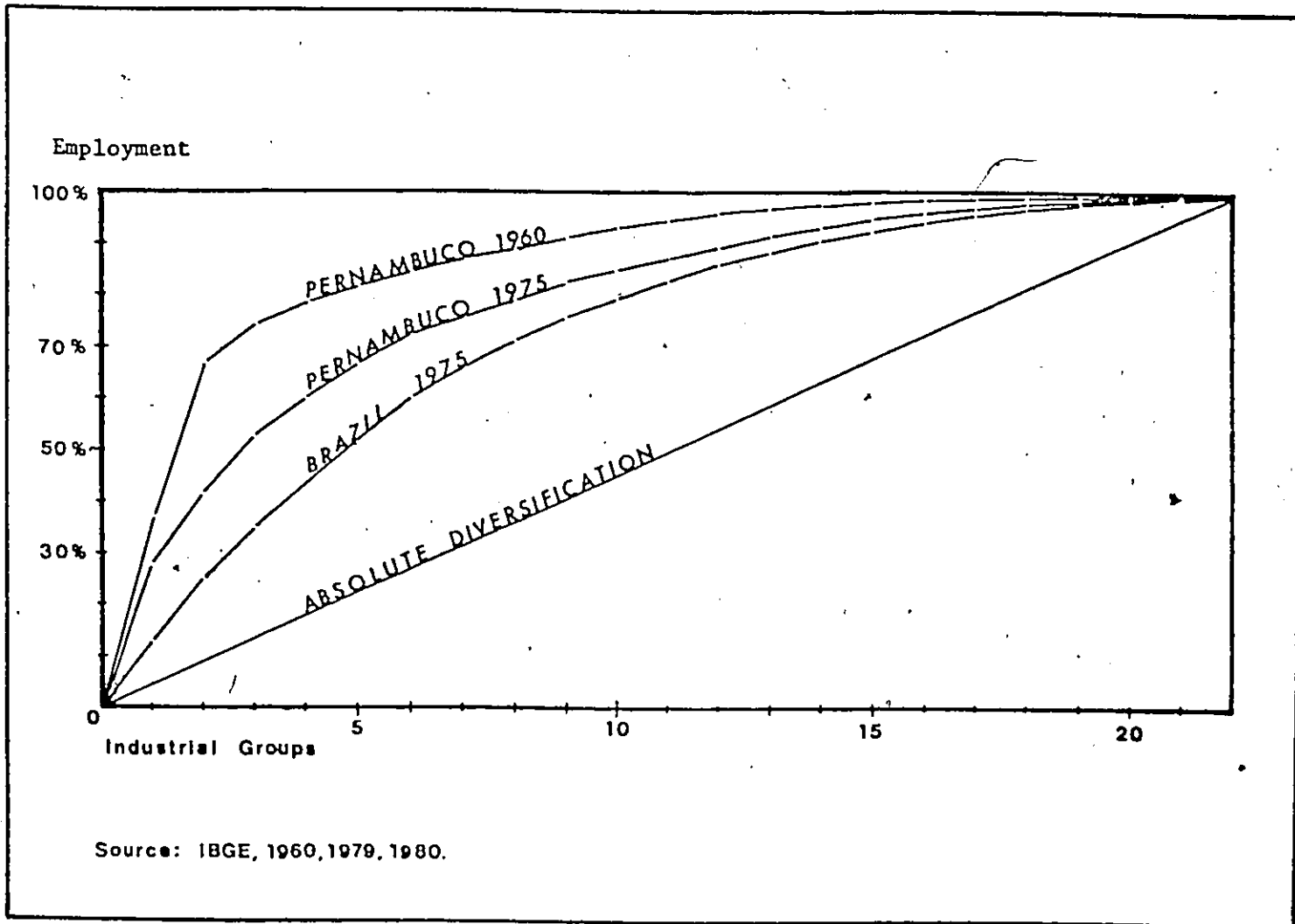


Figure 9: The Diversification of the Manufacturing Sector of Pernambuco, 1960-75

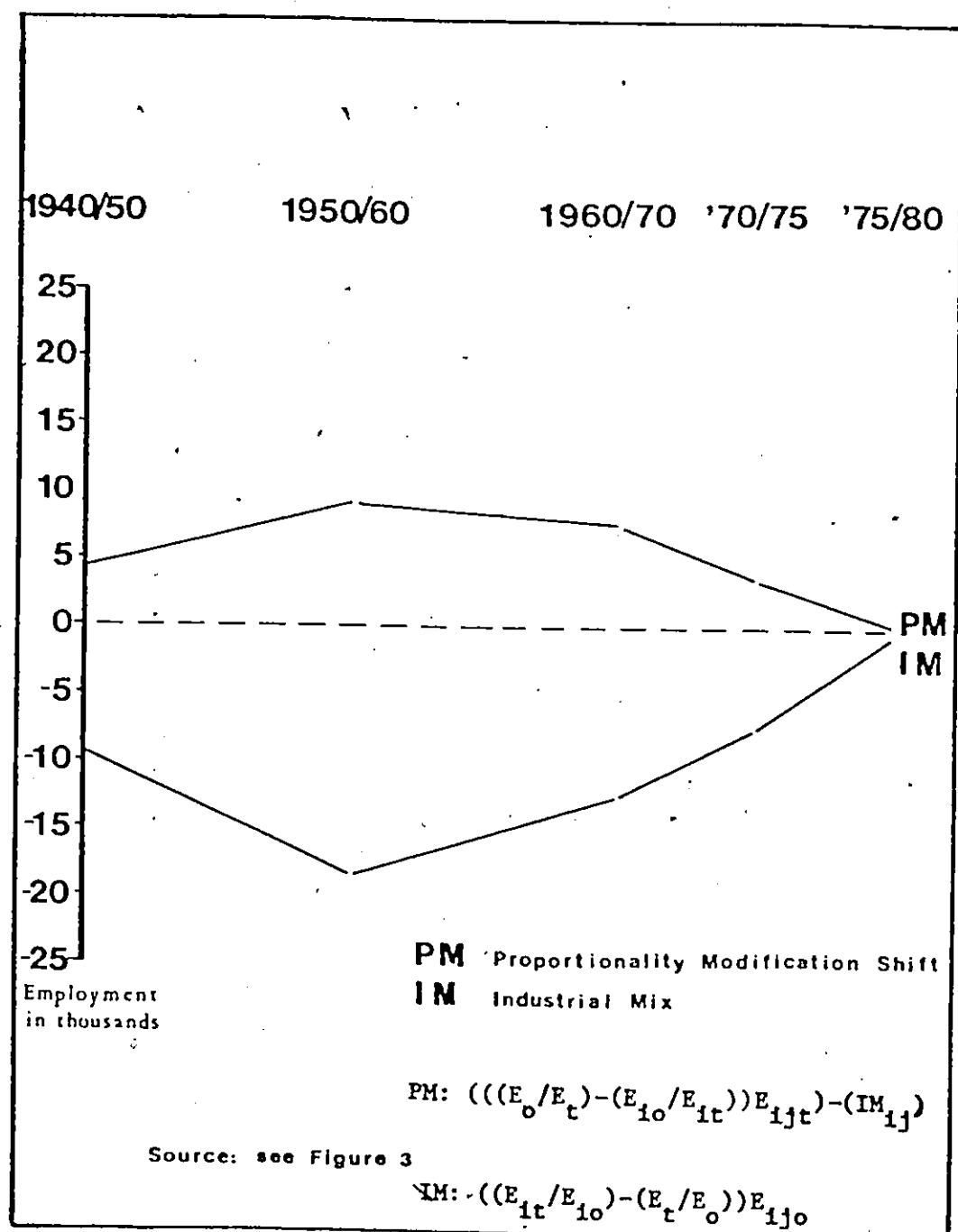


Figure 10: Industrial Mix and Proportionality Modification Shift,
Industrial Employment, Pernambuco, 1940-80

If we calculate these components for every intercensal period we find that though the IM has recorded negative values for all intercensus periods--which means Pernambuco is specialized in nationally slow-growing industries--there is a clear change of trends after 1960. This shows Pernambuco has changed its industrial composition during the 1960-80 period from concentrating in nationally slow-growing industries to diversifying its structure to include nationally fast-growing industries. The PM has been positive for all intercensus periods reflecting a change in the industrial structure of Pernambuco: from a traditional mix to a more diversified industrial structure. The peak for this component occurred for the 1950/60 and 1960/70 periods, when the industrial sector of Pernambuco drastically reduced the relative size of the workforce in textiles and food products (figure 10).

The Costs Associated with the Development of Modern Sectors:
The diversification of the industrial sector of Pernambuco (in terms of employment) results from a very sharp decline of traditional sectors and a fast growth of modern ones during the 1960-75 period. This diversification, however, has been costly, not only in terms of the number of jobs lost in traditional sectors but also in terms of the funds wasted in industrial ventures that did not succeed. Employment in textiles was reduced by substituting capital for labor. As we saw in the previous section, some textile plants reduced the size of their labor force while others closed down. Employment in modern sectors grew significantly but many projects either failed to be undertaken or closed down after beginning operation.

---Project Failure: Of all the industrial projects approved by SUDENE between 1960 and 1974, which closed down, were never undertaken, or were to be undertaken as of 1975/76 we find a large proportion in modern sectors. Thus, though the share of modern sectors of projects functioning as of 1975 was 41% for employment and 56% for investment, the share of modern sectors of non-functioning projects was higher: 57% for employment and 63% for investment. However, the opposite was true for traditional sectors. While their share of projects functioning as of 1975 was 58% in terms of employment and 43.5% in terms of investment; their share of non-functioning projects was lower: 43% for employment and 36% for investment. So, on average modern sectors had a higher failure rate than traditional ones. However, if we look at a sector by sector basis, other characteristics emerge.

Table 26 shows each sector's share of functioning and non-functioning projects in terms of two indicators: projected employment and projected investment. The table also shows the failure ratio of each sector measured also in terms of these two indicators: employment and investment. The ratios are calculated by dividing employment or investment at non-functioning projects for each sector by the total (i.e. functioning plus non-functioning) employment or investment for each sector and multiplying by a hundred. Sectors are ranked by their share of total investment. As table 26 shows, the modern sectors experiencing high failure ratios are metallurgy, chemicals, transport equipment, paper products, plastics, and perfumes; electric and communication equipments had a small share of

TABLE 26

Relative Share of Functioning and Non-Functioning Projects by Sector

Sector	A	Employment		Investment		Failure Ratios	
		Funct./Non-F.	Funct./Non-F.	Funct./Non-F.	Funct./Non-F.	Empl./Inves.	
		B	C	D	E	F	G
Textiles	+	34%	4%	32%	5%	2%	2%
Metallurgy	-	9%	16%	15%	15%	26%	10%
Chemicals	-	5%	12%	13%	17%	31%	14%
Electric and Comm.	+	11%	2%	8%	2%	3%	3%
Non-Metallic	+	7%	4%	7%	4%	10%	7%
Transport Equipment	-	2%	9%	4%	10%	41%	21%
Paper Prods.	-	3%	8%	4%	9%	38%	23%
Beverages	+	3%	1%	3%	1%	7%	3%
Food Prods.	-	9%	17%	3%	19%	26%	43%
Machinery	+	2%	1%	2%	1%	9%	5%
Clothing	-	9%	13%	2%	9%	21%	31%
Wood Prods.	-	.2%	.5%	2%	.2%	31%	2%
Plastics	-	2%	3%	1%	3%	24%	20%
Leather	-	.5%	2%	.5%	.5%	48%	11%
Furniture	-	.8%	3%	.4%	.3%	40%	9%
Printing	-	.6%	.7%	.3%	1%	20%	30%
Rubber		.4%	.4%	.3%	.8%	17%	21%
Mining	+	.4%	0%	.3%	0%	0%	0%
Others	-	.4%	.4%	.1%	.4%	21%	25%
Pharmaceutical	+	.2%	0%	.1%	0%	0%	0%
Perfumes	-	.	2%	.1%	2%	100%	99%
TOTALS		100%	100%	100%	100%	-----	-----

Source: SUDENE Reports, calculations by the author.

Note: A + means the share of functioning projects is larger than the share of non-functioning ones; - means the opposite.
B and C are the share of projected employment by sector in functioning and non-functioning projects.

D and E are the share of projected investment by sector in functioning and non-functioning projects.

F and G are failure ratios obtained by dividing absolute projected employment lost and absolute projected investment lost by total employment and total investment for each sector and multiplied by a hundred.

Non-functioning means projects were not undertaken or had closed down as of 1975.

failed projects. Of the traditional sectors, the only one that had a significant share of non-functioning projects as compared to its share of functioning ones was the food products sector. Textiles recorded the best performance of all sectors. Though the sector received 32% of the total investment, its share of investment of non-functioning projects only amounted to 5%. Textiles also recorded the lowest lost job/total number of jobs and the lowest lost investment/total investment ratios of all sectors. The performance of the rest of the traditional sector, with the exception of beverages was not outstanding. Food products and clothing performed poorly. However, because, with the exception of textiles, food products and clothing, the other traditional sectors have a negligible weight in the total employment and investment, their poor performance did not affect the performance of traditional sectors as a whole.

The higher failure rate of projects in some modern sectors may suggest that local conditions (source of raw materials, markets, labor force) are not favorable to the growth of modern sectors. That is, it would seem that for some sectors besides SUDENE incentives there are no other advantages for locating in Pernambuco. This is directly tied to the issue of linkages between the projects subsidized by SUDENE and the rest of the local economy.

---Linkages: Despite SUDENE's claim that one direct job created in manufacturing industry results in three indirect jobs,⁵⁴ it has been shown by several researchers that many of the industrial projects approved by SUDENE had few linkages with the local economy. Moreover, this lack of linkages was more marked for modern as opposed to traditional industrial sectors, and for implantation as opposed to modernization projects. This is a conclusion reached --for the Northeast as a whole--by Ferreira et al (1979), Goodman (1972), Goodman and Albuquerque (1974), Moreira (1978), and Redwood (1982).

5.2.4.5 Summary

Up to 1960 Pernambuco had a traditional industrial structure composed mainly of textiles and food products. The policies sketched by SUDENE in the Furtado Report in 1959 aimed at: (a) diversifying the industrial structure of Pernambuco by developing modern industrial sectors, and (b) restructuring traditional industries. These policies were carried out with mixed results as exemplified by the case of Pernambuco. The restructuring of tradi-

⁵⁴ SUDENE, 1980c:99, also Robock, 1963:158.

tional industries resulted in significant employment losses in pre-existing plants. The development of modern sectors was successful; even more jobs were actually created than it had been projected. However, the costs were high. A higher proportion of projects in modern sectors as compared to traditional ones failed³³ during the 1960-74 period. Moreover, some authors have shown that the linkages of successful modern projects were to a large extent with the South of Brazil and not with Pernambuco or the rest of the Northeast. As a result, indirect employment creation has also been very limited. In view of these findings we have to accept hypothesis 5a for there occurred an expected growth of modern sectors and a diversification of the industrial sector of Pernambuco; however, we have to reject 5b for industrial employment in textiles fell in absolute terms between 1960 and 1975.

³³ Were not undertaken, closed down, or were delayed in the implementation phase.

Chapter VI

CONCLUSIONS AND CONSIDERATIONS FOR FUTURE RESEARCH

6.1 METHODOLOGY

The general methodological framework adopted in this thesis proved to be very useful as a means of carrying out an evaluation study. Thus, the identification of three important pivots in which an evaluation may rest--the evaluation question, the evaluation design, and the criteria of success--helped us to focus and to shape our study; at the same time, the identification of what is methodologically important enabled us not only to maintain a fairly straight course but also to deepen those veins of inquiry which during the research showed to be more relevant and worth exploring.

The use of a before-during design was effective as a means of identifying changes in trends of industrial activity in Pernambuco. The adoption of this design also enabled us to have a more complete picture of the during SUDENE period by investigating the before 1960 period.

The use of data triangulation, that is the use of different data sources for the same event, proved to be, as Patton had suggested, "ideal" but also "very expensive" (Patton, 1980:108). Ideal because it enabled us to work with both actual and projected employment figures for SUDENE projects; thus we could calculate the actual impact of SUDENE-assisted projects on the industrial sector of Per-

nambuco. Ideal because it permitted us to make some new findings in a general topic that has been heavily studied. Expensive because many months, many nights, and many dollars were spent in locating, acquiring, coding, checking, and crosschecking data. Expensive because this time, these dollars could have been used to answer many of the questions still remaining about the impact on the industrial sector of Pernambuco of the program of industrial promotion. Nonetheless, the final balance is that data triangulation is to be highly recommended in the context of evaluation research of development programs. It may indeed be the only way to get around the opposition of policy makers to evaluation of their own performance (Richardson, 1978:32).

In this context, our findings show SUDENE has tried in many of its reports to downplay its defeats and highlight its successes. For instance we do not know any SUDENE report listing with complete details (address, name, product, line, etc.) industrial projects which have failed to be undertaken, or which have closed down; nor are we aware of any report attempting to establish the reasons behind the failure of industrial projects. The lesson to be drawn from this is that those interested in studying the industrialization promoted by SUDENE have to be aware this bias is present in many of the reports and studies published by SUDENE and that projected figures are not a good proxy for actual results.

Another lesson to be drawn from our study is that evaluations of SUDENE's program of industrial development can be more successfully undertaken if the focus is on one State and not the whole Northeastern region. At this scale it is possible to use other data

sources besides SUDENE, as we have done in this thesis. Narrowing the focus has also the obvious advantage of enabling the researcher to deepen its inquiry.

However, what has not been done, and is needed--if we are to learn more about SUDENE's program of industrial development-- is in depth studies by industrial sectors at the State level. These studies should focus on one or two important industrial sectors at a time. In the case of Pernambuco, for instance, these could be the textile, food products, or non-metallic mineral sectors. A thorough temporal and spatial analysis at the State level using secondary sources could be followed by a field survey of the sector. One of the main questions to be answered in such studies is what impact has SUDENE's program of industrial promotion had on a particular sector in terms of employment, output, machinery, etc.

6.2 CONCLUSIONS AND INTERPRETATION OF FINDINGS

Industry in Pernambuco, its Performance Versus the Nation: Using different indicators we have shown that the industrial sector of Pernambuco has lost ground vis-a-vis Brazil at least since 1940. This decline, however, has taken place at a slower rate after 1960--time of the creation of SUDENE. Because most of the change taking place in the industrial sector of Pernambuco has been associated with SUDENE's measures of industrial promotion (see Section 5.2), we may conclude that SUDENE's industrial policies were successful in slowing the decline of the industrial sector of Pernambuco vis-a-vis the Nation. Hence, SUDENE was successful in making the

industrial employment of Pernambuco grow faster in 1960-75 as opposed to 1940-60 although not as fast as the industrial employment of Brazil as a whole. This reconfirms other researchers' conclusions. For example Rocha concluded from a study of industry in Pernambuco that "the policy carried out enabled ...[the industrial sector of] Pernambuco to avoid having its performance more seriously eroded in relation to the Southeast of the country..." (Rocha, 1980:76). Jatoba suggested that the relative recovery during the 1960's of the manufacturing sector of Pernambuco vis-a-vis Brazil's can be attributed to the policies of industrial promotion in effect during this period (Jatoba, 1975b). Reboucas argued that for the period 1959-70 tax incentives in the Northeast resulted in the creation of 40% more industrial employment than would otherwise have been created (Reboucas, 1974; cited in Kutcher and Scandinazzo, 1981:16; also see Hirschman, 1968:5).

Projected and Real Employment: We have calculated that, at the most, SUDENE-assisted projects created only about half the number of jobs -projected as of December 1974. Still, SUDENE-assisted projects maintained around 15,388 existing jobs and created around 45,132 new jobs. This result does not match the criterium of success adopted for this point; for we had adopted an 80% success and the real success was around 58%. Moreover, the creation of employment at some establishments may be associated with a loss of employment at others.

Industrial Structure: The modernization of existing plants and the implantation of new ones seems to have been associated with the

destruction of employment not only in other plants but also in those plants being modernized. This seems to be the case of the textile sector, which in spite of receiving almost one third of the 34/18 investment and over one third of the projected employment, experienced an absolute decline in employment and a relative decline in the value added vis-a-vis the other industrial sectors of Pernambuco. Efforts towards developing modern industrial sectors, however, have met with more success; employment growth recorded by the censuses has matched and in some cases exceeded projected employment by SUDENE. However, projects in modern sectors have had a greater tendency to fail than projects in traditional ones. Moreover, as shown in other studies, because their linkages with the local economy are weak the multiplier effect of projects in modern sectors is more limited than that of traditional ones. This must have reduced to some extent indirect employment creation. It is suggested that the failure of SUDENE in creating and even maintaining employment in the textile sector is due to: the modernization of some but not all of the plants operating in the textile sector,³⁴ the substitution of capital for labor in some of the existing industries, and especially the establishment of firms based in Southern Brazil after 1967. The textile industry of Pernambuco had started to decline with the reduction of overseas demand after the end of World War II and the physical integration of the different regions of Brazil in one with the development of better transportation facilities. The coup de

³⁴ This was one general recommendation of a World Bank Report dealing with the restructuring of the textile industry in LDC's (see Vries and Brakel, 1983).

grace was given to the textile sector of Pernambuco by the establishment in Pernambuco of more efficient, more capital intensive, subsidized textile plants based in Southern Brazil.⁵⁷ The greater success attained by SUDENE in creating employment in modern sectors can be explained by the fact that very few plants existed in these sectors before 1960; hence the establishment of new plants did not bring about a competition with existing ones. Thus, the decline of traditional sectors, together with a reasonable growth of modern ones has resulted in a drastic change in the industrial structure of Pernambuco. We have to conclude that according to the criteria of success adopted in this study, in terms of industrial structure, SUDENE was only partially successful. The agency succeeded in promoting the growth of modern sectors and the upgrading of traditional ones. However, the upgrading of some establishments and the implantation of new ones in traditional sectors (especially textiles) was associated with a loss of employment in other establishments not receiving aid from SUDENE in these sector

Location of Industry: The March 1969 changes in the 34/18 system resulted in some dispersion of industrial projects--away from the Recife Metropolitan Area. Nevertheless, the dispersion was quite small, and if seen in the context of the State of Pernambuco, even insignificant.⁵⁸ When considered as a whole, the projects ap-

⁵⁷ These premises are presented in a wider and different context for the Northeast as a whole in Oliveira, 1977 (see also Rocha, 1980:75).

⁵⁸ With respect to the objective of spatial dispersion Goodman and Albuquerque said that "There is no indication that SUDENE explicitly pursued this objective." (Goodman and Albuquerque, 1974:202)

proved by SUDENE during the 1960-1974 period do not seem to have contributed to a spatial dispersion of industry in Pernambuco. The unwillingness of entrepreneurs to locate out of the RMA seems to have been associated mostly with the high risk of locating in the periphery. Despite this risk an important number of jobs have been created out of the RMA without SUDENE's incentives. In the RMA, however, the creation and the maintenance of a large number of jobs at some firms has been accompanied by a net loss of jobs at others. The losses are mostly associated with traditional industrial sectors, especially textiles, located in the municipalities of Moreno, Paulista, and Recife. Most of the jobs created out of the RMA without SUDENE's assistance, were created in municipalities immediately adjacent to the RMA and in municipalities of the Agreste. The creation of these jobs outside the RMA without SUDENE's assistance may point to the possibility that despite much willingness on the part of SUDENE to promote industry out of the RMA, a number of projects were undertaken without SUDENE's assistance in the interior of Pernambuco. The final balance may be that the 1969 changes in the 34/18 system resulted in little dispersion of industrial activity in Pernambuco. So that SUDENE was only marginally successful on this count. However, this marginal diffusion of investment and jobs away from the RMA after March 1969, coupled with employment losses and closure of some firms in the RMA, and creation of some employment out of the RMA without SUDENE's assistance enabled the areas outside of the RMA to maintain their share of employment and to recover by 1975 some of the value added lost during the 1960-70 period.

Employment Creation: Although the March 1969 changes in the 34/18 system favored the establishment of labor intensive projects, we have calculated that projects locating in Pernambuco after March 1969 were more than twice as capital intensive as those locating in Pernambuco prior to March 1969. This shows that despite changes in the 34/18 system-- changes that favored, on paper, the establishment of labor intensive projects--projects locating in Pernambuco after 1969 were more than twice as capital intensive as those locating in the first one. Thus, we have shown, on the one hand, that changes in the system did not increase labor absorption, on the other we have reconfirmed the findings of other researchers: that the reduction in the cost of capital results in a substitution of capital for labor. This is called the market critics interpretation (Baer, 1972). Some of the writers subscribing to this explanation in the context of the new industrialization of the Northeast are Goodman (1972,1976), Goodman and Albuquerque (1974), Goodman et al (1975), Pinto and Une (1977), Jatoba (1975a, 1975b), and Wadsted (1968).

Conclusion: We started this evaluation asking: "Was SUDENE's industrialization program successful in inducing change in industrial employment, location, and structure in the State of Pernambuco?"

The answer is no, for: (1) the decline of the industrial sector of Pernambuco vis-a-vis Brazil's continued after 1960, (2) the actual number of jobs created was only half of the projected number of jobs, (3) the change in industrial structure took place at the expense of a sizable employment loss associated mostly with SUDENE's incentives, and (4) changes in the system of incentives in 1969 did

not result in a dispersion of industry away from the RMA nor in greater employment creation per unit of capital investment.

6.3 FURTHER INTERPRETATIONS, AND RECOMMENDATIONS

Most of the poor results of the policy of industrial promotion can be associated with its emphasis in reducing capital costs. Capital being cheaper than labor, entrepreneurs opted for a capital intensive factor mix. This led to little employment creation. New firms and firms which had modernized their installations, had now-- because of their modern equipment--a competitive edge over existing firms which had not modernized their installations. To keep up with the new firms several firms even modernized more than once their installations (as was the case of textiles). Modernization led in many cases to employment losses. The March 1969 changes in the 34/18 system had, with respect to employment creation, contradictory provisions. On the one hand they favored labor intensive projects; on the other, they made capital even cheaper. The outcome was that projects approved between 1969 and 1974 were more than twice as capital intensive as those approved between 1960 and 1969. As for modern sectors, their rate of failure, was higher than for traditional ones; moreover, as shown in other studies, modern sectors tended to have a more limited effect on indirect employment creation due to weaker linkages with the local economy. These two characteristics of the projects in modern sectors point to their exoticity--that is, the little interdependence with the local economy--which indicates both uncertain prospects for the future of these projects once in-

centives are no longer in place, and an inefficient use of resources. As for location, we have seen that though the 1969 changes in the 34/18 policy had provisions discriminating in favor of peripheral locations, these provisions did not result in actual changes--most projects continued to locate in the RMA. However, the capital intensity of the industrialization promoted by SUDENE, the creation of substantial employment outside the RMA without SUDENE's incentives, the concentration of most of the new projects in the RMA both before and after 1969, and the destruction of existing employment in establishments in traditional sectors (either due to modernization or competition) located in the RMA, had the unforeseen effect of maintaining the same spatial distribution of employment and even of value added, in Pernambuco, throughout the period 1960-75 (considering only two regions: the RMA, and the rest of Pernambuco). The fact that most projects both before and after March 1969 located in the RMA and not elsewhere in Pernambuco should not be taken as an anomaly, as a complete fault on the part of SUDENE, or as an example of irrational behavior on the part of industrial entrepreneurs. As Goodman and Albuquerque, among others, have noted, neither Recife nor Salvador are at the limit at which external diseconomies of scale are being felt. Industrial entrepreneurs have probably exploited most of the possible and, if we look at the failure rates, also many of the impossible industrial possibilities outside the RMA. Indeed, it would seem that most of the successful industrial projects locating outside of the RMA with the support of SUDENE could not have, or at least, should not have located anywhere else but where they have located. Most of these projects are in mineral

extraction and/or transformation, and in other industries traditional of the interior of Pernambuco, such as leather and tanning, extraction of cotton seed oil, and food processing. It would seem that given the characteristics of the interior of Pernambuco much more could not have been achieved by SUDENE in terms of spatial dispersion of industry. However, some employment creation has occurred in the interior of the State (as pointed out before) without SUDENE's incentives. Moreover, as we will see the interior of Pernambuco has recorded remarkable employment growth rates in the informal secondary sector during the 1960-75. These points show possible avenues for research and policy direction.

A further interpretation of these findings has to take into account the fact that incentives came from funds which in theory belonged to the State, and hence to all Brazilians.⁵⁵ Furthermore, because of its characteristics, the 34/18 system enabled the largest companies to appropriate more incentives than the smaller ones. Most of the large companies have their headquarters in Southern Brazil. So the system of incentives enabled these companies to have an easier entry in the Northeast at the expense of all taxpayers.⁵⁶ The contribution of the subsidized industrialization of the Northeast to employment creation, and to the lessening of intra-state, inter-state, and even inter-regional inequalities has been limited. One

⁵⁵ The new interpretation of the industrialization of the Northeast comes from the contributions of Adamo (1980), Andrade (1981), Chaloult (1976, 1978), Furtado (1982, 3rd part), Moreira (1978), and Oliveira (1977).

⁵⁶ Since the Brazilian tax system is regressive, in relative terms, those earning less most probably contributed more (see Pereira, 1982).

explanatory variable of these outcomes is the one we advanced above: capital intensity.. However, a more encompassing evaluation has to take into account the fact that certain industries, certain regions, but more importantly certain social classes in Brazil benefited from this kind of industrialization. That is, there was a logic to the industrialization that took place after 1960 in the Northeast. Hence to propose more of the same seems absurd. But, are there other avenues open that could lead to a more successful promotion of the development of Pernambuco and of the Northeast?

Indeed, there may be.

Perhaps one of the most important consequences of the implementation of SUDENE's system of industrial incentives may be the polarization of industrial activities in Pernambuco in two groups of establishments. The first group is composed of those establishments that are: located mostly in industrial parks set up in the main urban areas, capital intensive, and producing for regional and national markets. The establishments in this group are likely to have received funds from SUDENE and have their headquarters in Southern Brazil. The second group is composed of those establishments that are: located mostly in the smaller urban centers, rural areas, or slums of the major urban areas, labor intensive, and producing mostly for local and regional markets. The establishments in this group are not likely to have received funds from SUDENE, and many of them may function in a clandestine or semi-clandestine situation.⁴¹

⁴¹ That is these establishments are not registered as manufacturing establishments, do not pay taxes, nor social security.

This polarization of industrial activities has already been suggested by Goodman and Albuquerque (1974:125), Jatoba (1975b), Redwood (1982), Rocha (1980), but more specifically by Neto (1982). Neto wrote that "With respect to industrial activities, [in the Northeast] we find a seemingly contradictory evolution, which permits the existence, side by side, of an industrialization process,....and an artisanalization process, which can be clearly observed from the employment growth rates. " (Neto, 1982:469).

Indeed, as it is noted in Appendix A.3.1 of this thesis, although in 1960, 60% of those employed in the secondary sector of Pernambuco were employed in formal industrial establishments,²² in 1970, those employed in these same establishments were only 44%; moreover, we have calculated that by 1980 they were only around 35%. Even allowing for the fact that those working in construction and public utilities are included in the secondary sector, these figures clearly show that employment in the informal secondary sector of Pernambuco grew faster than employment in the formal industrial sector, and during the 1960-80 period even faster than population. It is also very interesting to note that this growth has not been at the same rates throughout Pernambuco. Rather it has been more rapid (in relative terms) in the interior than on the coast or in the Recife Metropolitan Area. Thus, by 1970 only around 19% of those employed in the secondary sector in the Sertao were actually working

²² For 1940 and 1950 percentages were 68% and 64%, respectively. In this context employment in formal manufacturing is counted at the establishment by the Industrial Census whereas employment in informal manufacturing is the difference between total manufacturing employment counted at the household by the Demographic Census and formal manufacturing employment.

in a formal manufacturing establishment; for the Recife Metropolitan Area the figures were 46%, for the Mata Seca and Mata Umida around 59% and for the Agreste 39%.

Thus, without much--if any--⁶ assistance the secondary informal sector of Pernambuco has created employment at a rate higher than population growth while millions of cruzeiros from the public purse were invested in an industrialization that favored few.

Since the ILO Kenya Report many policies have been advanced to favor the informal sector (ILO, 1972). However, these policies have to be preceded by in depth studies of the linkages between formal and informal enterprises, and perhaps most importantly by studies that determine the nature of these linkages.⁶

⁶ SUDENE has some programs and incentives for small and medium manufacturing enterprises and for the promotion of handicrafts; however, their scope is limited. For instance, the program for Small and Medium Industries was to create 13,295 jobs by 1977 in all of the Northeast (BNB, 1977:Anexo 3).

⁶ See for example the analysis and criticism of the recommendations of the ILO Report in Leys (1975:258-271). Also see an excellent study along these lines in the Brazilian context by Schmitz (1982).

Appendix A
METHODOLOGICAL CONSIDERATIONS

A.1 THE SUDENE DATA MATRIX

A.1.1 General Description

Figure 11 shows one page of the matrix. The matrix contains 679 cases and 23 variables. Each case is one industrial project approved by SUDENE between 1960 and 1982. Projects are limited to those located in the State of Pernambuco. The matrix contains mining and manufacturing projects but it omits agricultural ones. Fishing and telecommunications were excluded if there was no processing or manufacturing of fish by-products or of telecommunications equipment. The matrix includes all implantation, modernization, expansion, reformulation, and complementing (complementacao) projects approved by SUDENE between 1960 and 1982. It includes all projects (the above mentioned ones plus reduction of import duties, etc.), for the periods 1960-1965 and 1970-1982. Thus, some projects approved between 1965 and 1969 may be missing. The matrix also includes those projects which have their activities paralyzed, closed down, or were never implemented.

In this matrix data for each project were recorded under four general headings: characteristics of each project, employment, implementation, and investment. Data sources include most of SUDENE's reports, the Industrial Cadastres for Pernambuco for 1965 and 1975, Government of Pernambuco's publications, SUDENE Informa, TELEPRESS,

An Example of the Structure of the Original Matrix

Columns 123456789_123456789_20-456789_123456789_40-456789_123456789_60-456789_1234567														
0010506	1	64137	357	175	-9	520	223	-911110	502	150	995	3278	3914	2374
0010900	3	64137	0						8867	2912				
0021106	1	54002	86	0	-9	86	-9	-900220	5600	3099		0		
0021203	2	54002	0						366	0				
0030907	1	38173	32	0	95	62	30	300212	780	585		780		
0031001	3	38173	95						3270	1342	2430	0		
0031205	8	38173							1287	0				
0031305	5	38173	92						12219	8435		0		
0041010	1	38176	97	0	120	120	25	12000220	6600	4950				
0050710	3	38176	92	35	100	83	171	17156864	606	166	133	3697	1015	413
0060511	3	13134	100	35	-9	105	350	-911110	781	180				
0060700	3	13134	143						1853	1194				
Columns 123456789_123456789_20-456789_123456789_40-456789_123456789_60-456789_1234567														

Figure 11: An Example of the Structure of the Original Matrix

and the Escola Interamericana de Administracao Publica of the FGV. What follows is a description of each variable, its source, and the way it was coded.

A.1.2 Characteristics of Each Project

Each case, each line in the matrix is one project. A firm may have had more than one project approved for the same establishment. Each establishment has an identification number (columns 1-3). If a single firm had two or more projects approved for different establishments at different locations, then each project receives a different identification number. An establishment is defined as a plant with one address where one or more productive processes may be under way. This definition is similar to that used in the Industrial Cadastre of 1975 but totally different from that used in the censuses and in the Industrial Cadastre of 1965. These publications defined an establishment as each different line of production, thus, we may have more than one establishment in the same plant.

Columns 4-7 contain the date of approval of a project. The date was defined in terms of two variables, one for the year (DATEANO) and one for the month (DATEMES). Years were coded as 1 to 23, being 1960 equal to 1, 1961 equal to 2...and 1982 equal to 23. The month of approval was missing in a number of cases, DATEMES was then assigned '00'.

Columns 8-9 contain the type of project, which ranged from 1: implementation to 12 reinvestimento. Table 27 shows the different types of projects approved and the corresponding codes.

TABLE 27

Types of Projects Approved by SUDENE

Code	Type	Tipo
1	implantation	implantacao
2	modernization	modernizacao
3	expansion	ampliacao
4	relocation	relocalizacao
5	reformulation	reformulacao
6	complementation	complementacao
7		revalidacao dos incentivos
8	exemption of	isensao de impostos de
9	import duties	importacao
10.		enquadramento para
11.		financiamento
12	reinvestment	reclassificacao na faixa de
		prioridade
		transferencia de equipamento
		reinvestimento

Columns 10-12 contain the location of projects. Location was defined in terms of municipalities inside Pernambuco. To each municipality corresponds one number according to its alphabetical order in the Industrial Census of Pernambuco of 1940. Thus, 13 is Belo Jardim, 64 is Recife, etc. up to 85.

Columns 13-15 contain the class of industry. Projects were classified individually. This means that an establishment may have had different projects approved to produce different products. In-

dustries were classified according to the 1970 Standard Industrial Classification, at the three digit level.

A.1.3 Employment Variables

Columns 16-19 contain the projected employment per project at the time of approval. Data is missing for around 5% of the projects. Most of these are projects approved between 1960 and 1963, between October 1967 and January 1968, and during 1969. For many types of projects (see table 27) no creation of employment was foreseen (for example, reductions in import duties, reformulations, complementations, etc.) In the case of modernizations and relocations, though SUDENE recorded total final employment as employment created, this figure may be lower than the employment figure for a particular establishment before the implementation of a modernization or relocation project. (See Section 5.2.1)

Columns 20-39 contain employment variables from other sources for the same establishment (as we understand it). In the case of an establishment with more than one project, these variables are listed in the first project approved. Thus establishment "001", "ABC Radio e Televisao" has two projects, one approved in 1964, and another approved in 1968, but for the projected employment variable, the other employment variables are only listed for the 1964 project (see figure 11). These employment variables are five: EMPL65, EMPL73, EMPL74, EMPL75, and EMPL76.

Variable EMPL65 contains the number of people employed in an establishment. In some cases the values for two or more productive

processes had to be aggregated to conform to the definition of establishment we are using (see Cadastro Industrial 1965: 'nota previa', n.p.). In this Cadastre employment was collected by groups as table 28 shows, and each group was given a code. We transformed the code into a number by taking the median between the two extremes of a group.

TABLE 28

Industrial Cadastre of Pernambuco of 1965, Codes, Groups, and Values Used in this Thesis

Code Used in Cadastre	Groups of Employees	Values Used
0	0	0
1	1 to 4	2
2	5 to 9	7
3	10 to 19	15
4	20 to 49	35
5	50 to 99	75
6	100 to 249	175
7	250 to 499	375
8	500 to 999	750
9	1,000 and more	1,000

Source: Cadastro Industrial, Pernambuco, 1965.

Thus, table 28 shows that group 1, including all those establishments (as defined in the Cadastre) with 1 to 4 people employed was given a 2, group 8 included those establishments with 500 to 999 employees and was assigned 750, and so on.

Columns 24-27 contain employment as recorded in the Pernambuco (1973) SERPE/FUNDINOR publication Dados Socio-Economicos Basicos de Pernambuco. Data are limited to those projects in districts and industrial parks (distritos and parques industriais), in the Recife Metropolitan Area approved up to 1973.

The variable EMPL74 lists the employment actually created (that is, in the case of modernization projects, between pre and post-modernization). Data from Pernambuco (1974) Secretaria de Ind. e Com. Dept. de Estudos Especiais. It includes all projects in Pernambuco except those which had closed down as of December 1974.

EMPL75 covers columns 32-35 and contains data taken from the Cadastro Industrial de Pernambuco 1975/76. The Cadastre omits Mining and Bakeries. Industries are classified according to the 1970 standard industrial classification (Pernambuco, 1976b).

EMPL76 contains data taken from Pernambuco (1976a) DIPER/FUNDINOR Guia dos Distritos Industriais do Grande Recife, 1976. It includes only those industries located in the Recife Metropolitan Area.

A.1.4 Implementation of a Project

Columns 40-43 contain five variables named STATUS67, STATUS68, STATUS72, STATUS74, and STATUS76. They record information on the situation of a project at a particular time. Codes are listed in table 29. Data were taken from: FGV EIAP 1968; Anexo iv (STATUS67); SUDENE, 1968b (STATUS68); SUDENE, 1972b SUDENE Informa (STATUS72) Pernambuco, 1974 Secretaria de Ind. e Com. Dept. de Estudos Especiais (STATUS74); and Pernambuco, 1976a DIPER/FUNDINOR (STATUS76).

TABLE 29

Situation of Projects, Data Sources, and Codes Used

Codes	Situation	1967	1968	1972	1974	1976
0	missing values					
1	New functioning	x	x	x	x	x
2	New under Way	x	x	x	x	x
3	New in Expansion					x
4	Modernization Completed		x	x		
5	Modernization/Expansion	x			x	
6	Modernization Under Way		x	x		
7	New Projected	x			x	x
8	Modernization Projected			x		
9	Not Implemented or Closed Down		x			x

Note: an 'x' denotes the use of a particular classification in one year.

A.1.5 Investment Figures for Each Project

Columns 45-77 contain investment data in thousands of cruzeiros. For each project we have a maximum of six investment variables. The first two are the most important and they relate to each project. The other four relate to the establishment. All investment variables are in historical cruzeiros except for INVTOT68 which is in current cruzeiros of March 1968.

The first two investment variables, INVTOTAL and INV3418P, contain the projected total investment and the 34/18 portion of this total respectively. Data are for the 1960-1963 period from Projetos Industriais Aprovados 1960-1963. (SUDENE, 1976a-d), for 1964 and 1965 from Projetos Industriais Aprovados Pela SUDENE (Artigos 34/18 Leis 3995/61 e 4239/63) Ate 31/12/65. (SUDENE, 1965). For the 1966-70 period from SUDENE, 1967, 1968b, 1969a, 1969b, 1970. And for 1971 through 1982 from SUDENE 1976e-i, 1978b-c, 1979, 1980b, 1981b, 1982b, 1983a.⁵⁵ To check the coherence and uniformity of these data from so many different sources we used a 1983 report listing all new, modernization, and expansion projects locating in Pernambuco between 1963 and 1982.⁵⁶ If there was a divergence, which only occurred in around 7% of the cases, we took values to be those of the 1963-1982 report.

⁵⁵ Actually the SUDENE had used a cover from the previous year, i.e. 1982.

⁵⁶ See SUDENE (1983b) unpublished report Office of the Superintendent, SUDENE, Recife, 1983.

Variables INV3418R and I3418R2 contain the actual amount of 34/18 funds received by each establishment at June 1967 and December 1969 respectively. Data were taken from SUDENE, 1967, 1969b.

Variable INVTOT68 contains total investment in all projects approved up to 1968 in March 1968 current cruzeiros.

Finally, I3418P2 contains the projected amount of 34/18 funds to be allocated to a project. Data were taken from SUDENE, 1969b.

A.2 STANDARIZATION OF MUNICIPALITIES, 1940-80

The problem of boundary changes was particularly serious since our study was to use Census data for six different time periods: 1940, 1950, 1960, 1970, 1975, and 1980. We had to solve two kinds of boundary problems: those arising from municipal boundary changes within the State of Pernambuco, and those resulting from changes in the boundaries of the State with the States that surround it.

In order to be able to compare municipal data from one time period to similar data from any other period we created "standarized municipios"--groups of municipalities whose boundaries have not changed, and thus are comparable throughout the 1940-1980 period."

Table 30 shows that between 1940 and 1970 the number of municipalities in the State of Pernambuco almost doubled from 85 in 1940 to 164 in 1970. No more municipalities were created after 1970. The task was to group municipalities in such a way that one had the same number of municipalities and the same boundaries for each time

" "Municipios" are what is known in Canada as municipalities and in the U.S. as counties. In the text we will take the term "municipalities" as the equivalent of "municipios".

period. We ended up with 79 standardized municipalities. The base map used is from the 1980 Sinopsis Demografica de Pernambuco (IBGE, 1981). First, we drew on this base map the boundaries of those areas which, according to a map from the IBGE, could be compared (see IBGE, 196?).

TABLE 30

Number of Municipalities in Pernambuco, 1940-1980

1940	85
1950	90
1960	102
1970	164
1975	164
1980	164

Then, starting with a list of the municipalities of 1940 we traced--using the Censuses--the partition of municipalities and the creation of new ones. Information was crosschecked using three gazeteers (Fortes, 1972; IBGE, 1950; and US Office of Geography, 1963). Finally, we cleared some remaining doubts after we found the publication by Ribeiro and Costa Araujo (1973) on the creation of municipalities in Pernambuco between 1940 and 1973. Still, the publication fails to point out that though 19 municipalities were created in 1958, the 1960 Census did not take these new municipalities

into account. The 1960 Census only considered the 12 municipalities created in 1953.

Although we have checked and crosschecked the evolution of the boundaries of each municipality some minor problems may remain because of errors in the publications consulted and/or the crude methods used to measure, survey, and delimitate municipal boundaries, especially in the interior areas of the State and particularly before the 1960's. However, since most of the data we will be using are for industries located in urban areas, most of them in the municipal seats, errors in the standardized boundaries will only be found in the fringes--usually rural--of the municipalities, and hence, these errors are of no concern to us. In any case, our map of standardized municipalities is roughly the same as the one of 1940 presented in the IBGE 1948 publication Sinopse Estadística dos Municípios de Pernambuco (IBGE, 1948). We have also taken into account changes in the names of municipalities and the creation of new municipalities from portions of two or more old ones. That is why though there were 85 municipalities in Pernambuco in 1940 the number of standard municipalities equals 79. A complete list of municipalities is provided in Appendix 'B'. The list is organized by standard municipalities and includes changes in the names of municipalities as well as the Census period in which they first appeared identified which may not necessarily coincide with the date of creation of the municipality.

A second consideration was boundary changes between Pernambuco and the five States surrounding it. According to the Censuses of

1970 and 1975, the State of Pernambuco covered an area of 98281 square kilometers (Censo Industrial 1970:xiii; 1975:xi). However, the Censo Demografico of 1940 gave the area of the State as 99254 square kilometers, while the Sinopse Estatística dos Municípios de Pernambuco declared the area to be only 97016 for mid-1945 (Censo Demografico 1940:n.p.n.; IBGE, 1948:n.p.)⁶⁶ Despite these divergences in the estimated area of the State (which could largely be accounted for by errors in surveying) no major inter-state boundary changes have occurred since the 1830's when the Comarca do Sao Francisco was transferred to Bahia after the Republican Revolutions of 1817 and 1824 (see Casimir, 1970:24; and Andrade, 1974:32)

A.3 INDUSTRIAL CENSUS DATA

A.3.1 Overall Description and Evaluation

The industrial Census data we will be using in this study are data that corresponds to the 1940, 1950, 1960, 1970, and 1975 Industrial Censuses for the State of Pernambuco. One of the biggest charges made against the Industrial Censuses is that they have failed to record all the industrial enterprises and all the industrial activities present in Pernambuco at any of the times in which information was collected. However, because most of the un-counted establishments are so called informal, and SUDENE's industrial policies focused on formal manufacturing establishments, this problem is only tangential to our work. Notwithstanding, the problem exists

⁶⁶ Being the area defined by Resolution #262 of Feb. 3, of 1947, of the Diretorio Central of the Conselho Nacional de Geografia, Sette and Andrade, 1959:36).

and is a serious one."

Sistematically, all the Industrial Censuses have failed to record those activities which were of an artisanal nature or which were not legally registered (Censo Industrial 1940:xxi; 1950:xxix; 1960:xyii; 1970:xiv; 1975:xi)."

The Industrial Censuses also fail to count outside workers ("trabalhadores em domicilio") although wages paid to them are recorded as expenses of the firms for which they work (Censo Industrial 1940:xxv; 1950:xxix; 1960:xvii; 1970:xx; 1975:xx). The size of this labor force can be estimated by comparing the size of the industrial labor force as counted in the Industrial Censuses (at the firm), and in the Demographic Censuses (at the household). As table 31 shows for the State of Pernambuco the figures were quite different. It is clear from these differences that there is a very sizable number of, not only people employed in industrial activities but not counted, but also of industrial firms which function in a more or less clandestine situation."

In the case of the clothing industry in Petropolis and the hammock industry in Fortaleza Hubert Schmitz found that,

the total number of people engaged in clothing production in 1970 was probably around three times the number given in the Industrial Census. It should be emphasized that this conclusion was based on rather crude estimates, but in all likelihood they constitute a lesser evil than taking the Industrial Census figures at face value...

" To make things simpler, Censuses will be referred to by their title and year of collection and not by author and year of publication. However, in the Bibliography, Censuses will appear by author, i.e. IBGE.

" See a very interesting account describing the development of a clandestine shoe factory in Rio de Janeiro in Valladao, 1982.

TABLE 31

Size of the Industrial Labor Force, Industrial and Demographic Censuses, Pernambuco, 1940-1980

	A Industrial	B Demographic	C A / B x 100	D Difference
1940	62,733	92,391	67.89	
1950	83,831	131,798	63.60	-4.29
1960	72,058	120,487	59.80	-3.80
1970	89,333	201,594	44.31	-15.49
1975	112,297	(a)		-9.63
1980	119,297	379,915	34.68 (b)	

Source: Censo Industrial, 1940, 1950, 1960, 1970, 1975; Censo Demográfico, 1940, 1950, 1960, 1970, 1980; Sinopsis Preliminar do Censo Industrial, 1980.

(a) No Demographic Census was collected in 1975.

(b) Data for 1980 from Sinopsis Preliminar do Censo Industrial excludes the smaller firms; in terms of employment it means around 10%. The ratio A/B x 100 was calculated by adding this estimated 10% to the 1980 industrial data.

it [the Industrial Census] does not cover outworkers which is a serious omission in the case of the clothing industry. Second, it leaves out many small-scale enterprises, largely because they are not registered.

Thus the Industrial Census gives at best an indication of the size of the internal workforce of the medium and large enterprises.

The data problem in the hammock industry is similar to that in the clothing industry. Although a relatively small textile branch, its real importance for employment is far greater than suggested by official figures. (Schmitz, 1982:58)

He concludes:

These examples are not meant to suggest that the official data are useless. They are to stress the dangers which are involved in basing a detailed survey on employment in the Brazilian textile and clothing industry on such data. The problems are particularly severe for small-scale firms, but they are by no means limited to this stratum of enterprises. (Schmitz, 1982:60)

This problem is not limited to the textile and clothing industry. It is also present in other branches of the secondary sector. Lima et al. (1975) on a study of the milk and milk products sector point that

The national statistical system still does not have the means to be able to produce exact and complete information for an adequate analysis of the market of milk products at the regional level.

The study by Lima et al. presents data gathered from different sources. For the year 1971, for example, it was estimated that 90.6% of the butter and 98.2% of the cheese produced in the Northeast came from small artisanal units ('unidades artesanais'). (Lima et al, 1975). Since we know that Industrial Censuses do not record as industrial workers those working in cottage-industries then we have to conclude that most of those employed in the milk and milk products sector are not counted in the Industrial Censuses.

Summarizing, then we have that the Industrial Censuses do not record information for firms which are not registered, nor do they take into account outside workers. Since this bias is present in all the Industrial Censuses and theoretically to the same degree, then comparisons among Censuses are possible.

One last point should be made. Brazil is not unique in having a sizable informal industrial sector which escapes due to its inherent clandestinity Censuses and Surveys. (See LARR Brazil, 1983,

1984). Canada, Italy, France, the U.S., the U.S.S.R., just to mention some of the developed countries, also have such a sector, and it is not a negligible one, specially in labor-intensive manufacturing branches. (See, Tanzi, 1983; also Time magazine, 1981, 1983; for Canada see Ross and Usher, 1983)

A.3.2 Standarization of the Industrial Classification

As mentioned before, in order to compare data for different time periods, these data have to be standarized because more often than not the definition of the variables representing these data changes from one Census to another.

The industrial classification we will adopt as the standard one for this study is the one used in the 1970 Industrial Census. According to this Census industries are divided in two "classes": "Industrias extractivas de produtos minerais" and "Industrias de transformacao", the latter ones divided in 21 "Generos" and 384 "Grupos" (Censo Industrial 1975:xvii-xviii).

The procedure followed to standarize the 1940, 1950, 1960, 1970, and 1975 industrial classifications consisted of two steps. The first step was to see whether this standarization was indeed possible. Thus, the introductory parts of the five Industrial Censuses were read. It was found that though the data for 1920 was not comparable to that for 1940 and 1950 (Censo Industrial 1950:xxv, and "Quadro 1"), all the Censuses noted that despite changes in the industrial classification, data was comparable from one census to the other (see Censo Industrial 1950:xxv; 1960:xiv; 1970:xvi;

1975:xiii-xv; also see IBGE (1963) Classificacao de industrias n.p.). Once it was established that comparability was possible the second step was to trace the changes in the industrial classification.

Table 32 shows that in 40 years the number of "generos industriais" has remained basically the same: around 22. What has changed is the number of "grupos" (three digit classification); this in response, undoubtedly, to a broader industrial base and technological change in later years. The number of classes has remained the same since 1960.

TABLE 32
Divisions of the Industrial Sector 1940-1975

	1940	1950	1960	1970	1975
	Extrativas	Extrativas	Extrativas	Extrativas	Extrativas
C	Trasformacao	Transformacao	Transformacao	Transformacao	Trasformacao
L	4	4	2	2	2
A	Construcao	Construcao	Construcao	Construcao.	Construcao
S					
S	Servicos	Servicos			
E	Industriais	Industriais			
S					
GENEROS	20	22	21	22	23
GRUPOS	?	132	126	384	407
SUBGRUPOS		404			

Source: Censo Industrial, 1940, 1950, 1960, 1970, 1975.

Figure 12 shows the two digit industrial classifications for the five Census periods. The information displayed in this figure was collected from the five industrial censuses and the 1963 IBGE publication. Figure 12 also takes into account changes at the three digit level of classification ("grupos"), according to the information presented in the industrial censuses (Censo Industrial 1950:Quadro 1; 1960:xv, Quadro 1; 1970:xv-xvii; 1975:xiii-xvi; and IBGE, 1963:n.p.). Figure 12 is organized in terms of the 1970 two digit classification system.

Starting with the 1950 Industrial Census, each Census has presented a table with data at the two digit level for each Census and the previous one--the data for the previous Census being grouped in terms of the more recent industrial classification. This, combined with a review of changes in the industrial classification as they appear in the introduction of each Industrial Census has enabled me to take into account not only changes at the two digit level but also at the three digit one.

A.3.2.1 Grouping 1940 Data in Terms of the 1970 Classification

The grouping was done mainly with the help of the tables on pages 188, 139, and 33 of the 1940, 1950, and 1960 Industrial Censuses respectively, for the State of Pernambuco. The two latter tables compare the results of each Census with the preceding one; hence data are re-arranged in terms of the more recent industrial classification. However, some of the tables listed only the blue collar workers (1950 Census) or the average number of blue collar

	1940	1950	1960	1970	1975
00	Extrativas Minerais Vegetais	Extrativas Minerais Vegetais	Extrativas Minerais	Extrativas Minerais	Extracac de Minerais
10	Produtos de Minerais Nao Metalicos	Produtos de Minerais Nao Metalicos	Produtos de Minerais Nao Metalicos	Produtos de Minerais Nao Metalicos	Transformacao de Prods. de Minerais Nao Metalicos
11	Metallurgicas	Metallurgicas	Metallurgicas	Metallurgicas	Metallurgica
12	Mecanicas	Mecanicas	Mecanicas	Mecanica	Mecanica
13		Material Ele- trico e de Comunicacoes	Material Ele- trico e de Comunicacoes	Material Ele- trico e de Comunicacoes	Material Ele- trico e de Comunicacoes
14		Material de Transporte (Con- strucao e Rodagem)	Material de Transporte	Material Transporte	Material de Transporte
15	Madeiras e Produtos Afins	Madeira	Madeira	Madeira	Madeira
16		Mobiliario	Mobiliario	Mobiliario	Mobiliario
17	Papel e Papelao	Papel e Papelao	Papel e Papelao	Papel e Papelao	Papel e Papelao
18	Borracha	Borracha	Borracha	Borracha	Borracha
19	Couros e Peles Pelos, Fios e outros Despojos Animais	Couros e Peles	Couros e Peles	Couros e Peles e Produtos similares	Couros e Peles, Ar- tefatos para Viagem
20	a-Quimica e Farmaceutica b-Oleos e Graxas	Quimica e Farmaceutica (a + b)	Quimica	Quimica e	Quimica
21			Paracetica e Medicinal	Prods. Paraceticos Veterinarios	Prods. Paraceticos e Veterinarios
22			Parfumeria Sa- boes e Velas	Parfumeria Sa- boes e Velas	Parfumeria Sa- boes e Velas
23			Materias Plasticas (fros Diversas)	Prods. de Materias Plasticas	Prods. de Materias Plasticas
24	Texteis	Texteis	Texteis	Texteis	Textil
25	Vestuario, Calcado e Acessorios	Vestuario, Calcado e Artes. de Tecidos	Vestuario e Cal- cado	Vestuario, Calcado e Artes. de Tecidos	Vestuario, Calcado e Artes. de Tecidos
26	Prods. Alimentares	Prods. Alimentares	Prods. Alimentares	Prods. Alimentares	Prods. Alimentares
27	Bebidas e Estimulantes	Bebidas	Bebidas	Bebidas	Bebidas
28		Fumo	Fumo	Fumo	Fumo
29	Editoriais e Graficas	Editoriais e Graficas	Editoriais e Graficas	Editoriais e Graficas	Editorial e Grafica
30	Miscas	Diversas (-Misc. e Portion of 32)	Diversas	Diversas	Diversas
31	Construcao Civil	Construcao Civil			
32	Producao e Distri- bucão de Electrici- dade, Gas e Fric, Abastecimento de Agua, Resgoto	Servicos Indus- triais de Utili- dade Publica	Not in manufac- turing (but a Portion went to 20)		Atividades de Apoio e de Servicos de Carac- ter Industrial
					Atividades Administrativas

Sources: Censo Industrial, 1940, 1950, 1960, 1970, 1975.

Figure 12: Evolution of the Industrial Classification, 1940-1975

workers employed (Censo Industrial 1960:33). Where possible we have referred to other tables so as to record the total number of people working.

From "Extrativas" we dropped "Extrativas de Produtos Vegetais" since it is not present in the 1970 Census. "Generos" 10, 11, and 12 remained the same. Generos 13 and 14 had in 1940 none and five people working (Censo Industrial 1950:139). Generos 15 and 16 were one in 1940 and were divided in two. Total employment is calculated as follows: we know the number of blue collar workers in each genero for 1940 (Censo Industrial 1950:139) and the total employment for the two generos taken together (Censo Industrial 1940:188). We subtract total number of blue collar workers from total number of people employed. Then we assign each genero (15 and 16) a portion of total white collar workers proportionated to that genero's weight on the total number of blue collar workers on both generos.

In numbers:

Thus, the calculated totals are for Madeira, 238 (204+34), and for Mobiliario, 961 (824+137).

Generos 17 and 18 remained the same. The genero Pelos, penas, e outros despojos animais was dropped.

For 1940 we only know the total number of people employed in Quimica and those working in the production of "Oleos e graxas vegetais". Since the Census does not provide a breakdown at the three digit level we have assumed the proportions to be the same as in 1950 for the total number of people employed in Generos 20, 21, and 22. (This can cause problems if we are to analyze changes in these industries individually; however, because we aggregate them after

1940 total employment in Madeira e Produtos Afines:

1119

1940 blue collar employment in:

Madeira 204

Mobiliario 824

1940 total blue collar employment,
Madeira+Mobiliario =1028

1940 total employment-total blue collar
1119 - 1028 = 171

weighting each genero and taking proportions we get:

total blue collar : blue collar in Madeira
total white coll. X

1028/171 : 204/x ; x = 33.93

total blue collar : blue collar in Mobiliario
total white coll. X

1028/171 : 824/x ; = 137.06

calculating the shift-share components, this will not introduce bias in our analysis)

In numbers:

For Genero 23 employment was first recorded only in the 1960 Census. So, we may assume that for 1940 there was no establishment in the State of Pernambuco producing plastics. (See Censo Industrial 1960:33). Generos 24,25, and 26 remain the same with the exception of 'Toucador' in 25 which was incorporated into 22. The 1940 Genero "Bebidas e estimulantes" was divided in two and total employment calculated as for Madeira and Mobiliario using proportions. (See Censo Industrial 1950:139). Genero 29 remains the same. Genero 30 "Mistas" was merged with part of the old "Producao e distribucao de eletricidade, gas, e frio. to form "Diversas", but we only

1940 total number of people employed in
Quimicas e Farmaceuticas + Oleos e graxas vegetais
1520

1950 total number of people employed in Generos 20, 21, 22
2430

divided as follows:

Genero 20 :	1618	66%
Genero 21 :	332	14%
Genero 22 :	480	20%
TOTAL :	2430	100%

Assuming the same proportions for 1940 we get:

1940 Genero 20 :	1003
Genero 21 :	213
Genero 22 :	304
TOTAL :	1520

have blue collar employment due to confidentiality provisions (see Censo Industrial 1950:139). "Construcao civil" and "Producao e distribuicao de eletricidade..." were dropped.

Grouping 1940 data in terms of the 1970 industrial classification was quite complex because in the 1940 Census data were presented only at the two digit level.

A.3.2.2 Grouping 1950 Data in Terms of the 1970 Classification

This grouping was done comparing the three and four digit industrial classification (grupos and subgrupos) for 1950 and 1970 (Censo Industrial 1950:204-210, table 35; Censo Industrial 1970:46-84, table 3). Generos 00 through 19 remained the same. "Quimica e Farmaceutica" was divided in three Generos by disaggregating data (Censo Industrial 1950:207). Genero 23 had no employment in 1950 (Censo Industrial 1960:33). Generos 24 through 30 remain the same. "Construcao civil" and "Servicos industriais de

"utilidade publica" were not included in the Industrial Census of 1970, only "Producao e distribucao de gaz de iluminacao" was transferred to Genero 20, "Quimica", though there does not seem to be any establishment under that category.

A.3.2.3 Grouping 1960 Data in Terms of the 1970 Classification

At the two digit level it was not necessary to do any changes (see Censo Industrial 1960, table 2c; 1970, tables 1 and 3). Changes at the three digit level are listed in pp. xv-xvii of the 1970 Industrial Censuses, however, they are of no concern to us because in 1960 there was no recorded establishment manufacturing these products.

A.3.2.4 Grouping 1975 Data in Terms of the 1970 Classification

As one can see in Table 32 there were no major changes at the two digit level. Although two new Generos were introduced: 31, "Atividades de apoio e de servicos de carater industrial", and 32 "Atividades administrativas". These two new Generos were created to record information on activities and services of support to manufacturing.

Changes at the three digit level between and within Generos are listed in pages xiii-xv of the 1975 Industrial Census. Most of the changes are not significant because neither in 1970 nor in 1975 were there in Pernambuco any establishments manufacturing such products. Only in a few cases it was necessary to re-group the 1975 Census data in terms of the 1970 classification. One "grupo" (three digit

level) with 1 establishment in Genero 12 had to be moved to Genero 14. One "grupo" with 3 establishments and a total of approximately 25 people employed had to be transferred from Genero 16 to Genero 23. One "grupo" with two or three establishments and approximately 40 people employed had to be re-grouped in Genero 27 from Genero 20.

A.4 THE ECONOMICALLY ACTIVE POPULATION (PEA): THE DEMOGRAPHIC CENSUS

Some changes in classification have occurred between the different censuses. Where possible data were aggregated so as to permit meaningful comparisons. Nonetheless some inconsistencies remain.

The PEA is defined as all the people ten years or older, even those looking for a job for the first time or those temporarily unemployed.¹¹ Those classified as non-economically active include students, retired people, those in jail, the handicapped, and those in charge of domestic activities, mostly housewives (IBGE, 1980a). Those in charge of domestic activities were included in the service sector in the 1940 and 1950 Censuses, but we have excluded them to permit meaningful comparisons.¹²

The PEA in agriculture or primary sector includes those in agriculture, cattle raising, hunting and fishing, and vegetable extraction (extracao vegetal). The PEA in industry or secondary sec-

¹¹ The unemployed were not included in the censuses prior to 1970. Beginning with the 1970 Census they were included in the totals for the PEA but not in the totals for each of the three sectors.

¹² For Pernambuco they amounted to 672,331 and 1,040,078 for the 1940 and 1950 Censuses respectively.

tor includes those engaged in manufacturing, mining, construction, industrial services, and public utilities (gas, electricity, etc.).

The PEA in services or tertiary sector includes those in retailing and wholesaling, in transportation and communications, in personal services (hotels, restaurants, entertainment, etc.), in social activities (community activities, health, teaching), in public administration (including police, and military), and in a residual, other activities sector.

The population to be counted--whether as economically active or non-economically active--was not always defined in the same fashion. The 1940 Census included the populacao de fato. The 1950 Census included only the peessoas presentes. Latter censuses did not make this distinction. Although we have not been able to modify the data these differences in classification are negligible. For example, the 1940 Demographic Census records the populacao de fato to be 2,688,240, the populacao de direito, 2,681,032, and the moradores presentes --the 1950 Census peessoas presentes -- 2,667,354, for the whole state, a difference of 7,208 and 20,886 for the latter two classifications in relation to the first one.

Those included in the PEA were those 10 years or older except for the 1960 Census which included all those engaged in an economic activity. We suspect that not too many children under 10 years of age were counted as part of the PEA, but the data could not be modified.

Finally, all the censuses (except the one of 1960) divide the PEA in more than three sectors, but without consistency so it was

necessary to aggregate them in three to permit meaningful comparisons.

Appendix B

PERNAMBUCO, LIST OF STANDARD MUNICIPALITIES, 1940-80

NOTE: Using the methodology described in Appendix A.2 we have grouped the municipalities of Pernambuco in 79 "standard municipalities"--that is, municipalities or groups of municipalities for which boundaries have not changed throughout the 1940-80 period. In the following list standard municipalities are denoted by capital letters. Dates in parentheses correspond to the Census at which municipalities appeared for the first time. A slash marks a change in the name of the municipality. The order of municipalities follows the order of the 1940 Industrial Census. A few municipalities formed from two or more existing ones, that is why though there were 85 municipalities in 1940, we have ended up with 79.

- 1 AFOGADOS DA INGAZEIRA
 - 86 Igaraci (1970)
 - 87 Ingazeira (1970)
 - 88 Solidao (1970)
 - 89 Tabira (1950)
 - 90 Tuparetama (1970)
- 2 AGUA PRETA
- 3 AGUAS BELAS
 - 91 Iati (1970)
 - 92 Itaiba (1970)
- 4 ALAGOA DE BAIXO (1940) / SERTANIA (1950)
- 5 ALIANZA
- 6 ALTINHO
 - 93 Ibirajuba (1970)
- 7 AMARAGI (1940) / AMARAJI (1950)
 - 94 Cortes(z) (1960)
 - 95 Primavera (1970)
- 8 ANGELIM
 - 23 Canhotinho (1940)
 - 96 Jupi (1970)
 - 97 Palmeirina (1950)
 - 110 Calcado (1970)
 - 111 Lajedo (1950)
- 9 BARREIROS
 - 98 S. J. da Coroa Grande (1970)
- 10 BEBEDOURO (1940) / AGRESTINA (1950)
- 11 BELEM (1940) / JATINA (1950) / BELEM DE S. FCO. (1960)
 - 99 Itacuruba (1970)
- 12 BELMONTE (1940) / MANISSOBAL (1950) / S. J. DO BELMONTE (1960)
 - 100 Mirandiba (1970)
- 13 BELO JARDIM
- 14 BEZERROS
 - 101 Camoacim de Sao Felix (1960)
 - 102 Saire (1970)
- 15 BOA VISTA (1940) / CORIPOS (1950) / STA. MARIA DA BOA VISTA (1960)
- 16 BODOCO
 - 103 Granito (1970)
- 17 BOM CONSELHO
 - 104 Terezinha (1970)
 - 105 Saloa (1970)
- 18 BOM JARDIM
 - 106 Machados (1970)
- 19 BONITO
 - 107 Barra de Guabiraba (1970)
- 20 BUIQUE
 - 51 Moxoto (1940) / Inaja (1950)
 - 108 Tupanatinga (1970)
 - 136 Ibimirim (1970)
- 21 CABO
- 22 CABROBO
 - 109 Oroco (1970)
- 24 CARPINA
- 25 CARUARU
 - 112 Riacho das Almas (1960)

- 26 CATENDE
 72 S. Joaquim (1940) / S. Joaquim do Monte (1950)
 113 Belem de Maria (1970)
- 27 CORRENTES
 114 Lagoa do Ouro (1970)
- 28 CUSTODIA
 115 Betania (1970)
- 29 ESCADA
- 30 EXU
 76 Serrinha (1940) / Serrita (1950)
 116 Sitio dos Moreiras (1970)
 157 Cedro (1970)
- 31 FLORES
 117 Calumbi (1970)
 118 Carnaiba (1960)
- 32 FLORESTA
- 33 GAMELEIRA
- 34 GARANHUNS
 119 Brejao (1970)
 120 Caetes (1970)
 121 Paranatama (1970)
 122 S. Joao (1970)
- 35 GLORIA DO GOITA
 123 Cha de Alegria (1970)
 124 Feira Nova (1970)
- 36 GOIANA
 125 Condado (1970)
 126 Itaquitanga (1970)
- 37 GRAVATA
 127 Cha Grande (1970)
- 38 IGARASSU
 128 Itamaraca (1970)
- 39 IPOJUCA
- 40 ITAPARICA (1940) / PETROLANDIA (1950)
 129 Tacaratu (1960)
- 41 JABOATAO
- 42 JOAO ALFREDO
 46 Limoeiro (1940)
 130 Salgadinho (1970)
 132 Cumaru (1970)
 133 Passira (1970)
- 43 JUREMA
- 44 LAGOA DOS GATOS
- 45 LEOPOLDINA (1940) / PARNAMIRIM (1950)
 131 Terra Nova (1970)
- 47 MACAPA (1940) / MACAPARANA (1950)
 134 S. Vicente Ferrer (1960)
- 48 MADRE DE DEUS (1940) / BREJO DA MADRE DE DEUS (1950)
 135 Jatauba (1970)
- 49 MARAIAL
 63 Quipapa (1940)
 148 S. Benedito do Sul (1970)
- 50 MORENO
- 52 NAZARE (1940) / NAZARE DA MATA (1950)

	137 Buenos Aires	(1970)
	138 Tracunhaem	(1970)
53	OLINDA	
54	OURICURI	
	139 Ipubi	(1970)
55	PALMARES	
	140 Joaquim Nabuco	(1960)
56	PANELAS	
	141 Cupira	(1960)
57	PAUDALHO	
	142 Lagoa do Itaenga	(1970)
58	PAULISTA	
59	PEDRA	
	143 Venturosa	(1970)
60	PESQUEIRA	
	144 Alagoinha	(1950)
	145 Pocao	(1960)
	146 Sanharo	(1950)
61	PETROLINA	
	147 Afranio	(1970)
62	QUEIMADAS (1940) / OROBO	(1950)
64	RECIFE	
65	RIBEIRAO	
66	RIO BRANCO (1940) / ARCOVERDE	(1950)
67	RIO FORMOSO	
68	SALGUEIRO	
	149 Verdejante	(1970)
69	S. BENTO (1940) / S. BENTO DO UNA	(1950)
	150 Cachoerinha	(1970)
	151 Capoeiras	(1970)
70	S. CAETANO (1940) / S. CAITANO	(1950)
	152 Tacaimbo	(1970)
71	S. GONCALO (1940) / ARARIPINA	(1950)
	153 Trindade	(1970)
73	S. J. DO EGITO	
	154 Brejinho	(1970)
	155 Itapetin	(1960)
	156 Santa Teresinha	(1970)
74	S. LOURENCO (1940) / S. LOURENCO DA MATA	(1950)
75	SERRA TALHADA	
77	SIRINHAEM	
78	SURUBIM	
79	TAMBE (1940) / ITAMBE	(1980)
	158 Camutanga	(1970)
	159 Ferreiros	(1970)
80	TAQUARITINGA (1940) / TAQUARITINGA DO NORTE	(1950)
	160 Sta. Cruz do Capibaribe	(1960)
	161 Toritama	(1960)
81	TIMBAUBA	
82	TRIUNFO	
83	VERTIENTES	
	162 Frei Miguelinho	(1970)
	163 Sta. Maria do Cambuca	(1970)
84	VIVENCIA	

85 VITORIA (1940) / VITORIA DE STO. ANTAO (1950)
164 Pombos (1970)

Appendix C

LIST OF FIRMS AND NAME CHANGES, PROJECTS APPROVED BY
SUDENE IN PERNAMBUCO 1960-1982

AN '*' DENOTES THE FIRM HAS CHANGED ITS NAME

Firms are listed alphabetically following the general Brazilian usage in industrial directories--i.e. firms go by the first letter of their name. The list includes all projects; even those which closed down. For sources and methodology see chapter 4 and Appendix A.1.

BR Brazil

Cia. Companhia

Com. Comercial

Ind. Industria

Indl. Industrial

Inds. Industrias

Ltda. Limitada

NE Nordeste

PE Pernambuco

S/A Sociedade Anonima

Soc. Sociedade

ABC Radio e Televisao

Acomoveis S/A Ind. e Com.

Acrilnorte Ind. e Com. de Petroquimica e Plasticos

Acumuladores Moura

AGANOR Gases e Equipamentos

A. F. Soares S/A Agro-Industrial

Agricultura Ind. e Com Veremundo Soares

Agrofertil S/A Ind. e Com. de Fertilizantes

*Agro Indl. Sororoca (Now Inds. de Ceramica Sororoca)

Agroquimica Indl. do NE S/A - AGROQUISA

Alba NE S/A Ind. Quimica

Algodoeira Paulista do NE

*Algodoeira Uniao do BR (Now Tecelagem Parahyba)

Alimentos de Milho - AMISA

Alimentos do NE S/A ALINOR

Alimentos do Vale Sao Francisco Ltda

Alimonda Irmaos S/A

ALPAC Envelopes

Alpargatas NE S/A ANSA

Aluminio do BR NE S/A - ALBRA NE

Aluminio S/A Extrusao e Laminacao

Alumisa Ne S/A

Amorim Primo & Cia.
 Amorim Primo & Cia. - Refineria Paulista
 Ancora do Ne
 Andes Artefatos de Papel Ltda.
 Antonio Quintino Leite Filho (Also as Laticinios Sanharo-
 Ex Freitas e Guimaraes. Ex Laticinios Boa Vista)
 Araripe Textil- ARTESA
 Artefatos de Borracha O.K. S/A
 Artefatos de Paeis Ltda. - ARDEP
 Artefatos de Papel do NE - ARTEPE
 Artefatos de Pesca do NE - ARTEPESCA
 Artefatos Tenicos Olinda - ARTOL
 Artes Graficas Gomes de Souza do NE Ltda.
 ATLANTUM (Ex Cia. de Pesca do Atlantico)
 Babilonia Agro-Indl. S/A
 Bettamim do NE Ind. de Escovas Ltda.
 Bombril do NE S/A Ind. e Com.
 Borlem do NE Empresa Indl. (Ex Rodas Arcaro)
 Brasil Mineracao - BRASIMIC
 Brinco do Ne Ltda.
 Brilhamais do NE Ltda.
 Calcario de PE - CALPESA
 *Campos Moreira Ind. de Autopecas (Now SILBER)
 Cargill NE S/A
 Carpinaves S/A
 Caulim do NE S/A
 *Ceramica Araujo (now Ind. Ceramica Araujo)
 Ceramica Conceicao de Vitoria Ltda. (Ex Ceramica Tapacura)
 Ceramica Gravata Ltda.
 Ceramica Irmaos Unidos S/A
 Ceramica Martini do NE S/A
 Ceramica Santa Clara S/A (Ex Jose Pires & Cia.)
 Ceramica Santo Antonio Ltda.
 *Ceramica Tapacura S/A (Now Ceramica Conceicao de Vitoria Ltda.)
 Cermic Produtos Ceramicos
 *Cesar Jose Araujo (Now Confeccoes Klass)
 Csmel do NE Estruturas Metalicas
 Chelna S/A Ind. Eletronica
 Cia. Agro-Indl. de Belo Jardim
 Cia. Agro-Indl. de Igarassu
 Cia. Alcoolquimica Nacional- ALCOLQUIMICA
 Cia. Americana Ind. de Onibus do Norte - CAIO NORTE
 Cia. Brasileira de Estruturas Metalicas - CIBRESME
 Cia. Brasileira de Torres
 Cia. Cervejaria Brahma S/A
 Cia. Cloro Alcoolquimica de PE
 Cia. de Acos do NE
 Cia. de Botoes Agreste
 *Cia de Cimento Portland Goias (Now Mineracao Sao Severino S/A
 Ind. e Com.)
 Cia. de Cimento Portland Poty
 Cia. de Industrializacao do Leite de PE - CILPE
 Cia. de Inds. Brasileiras - PORTELA
 *Cia. de Pesca do Atlantico - COPESA (now ATLANTUM)

Cia. de Tecidos Paulista
 Cia. Eletro-Metalurgica do BR - NORLAR (Ex Inds. Reunidas de Refrigeracao)
 Cia. Fabrica Yolanda S/A
 Cia. Fiat Lux de Fosforos de Seguranca
 *Cia., Ind. Alimenticia de Pesqueira (Now Cia. Inds. Alimenticias de Pesqueira)
 Cia. Ind. de Alimentos Arcoverde Ltda.
 Cia. Ind. de Calcareo Ltda. - CINCAL
 Cia. Ind. de Instrumentos de Precisao - CIIP
 Cia. Ind. de Lajes - LAJESPUMA
 Cia. Ind. de Plasticos - CIPLANORTE
 Cia. Ind. de Vidros - CIV
 Cia. Ind. Metalurgica do Cabo - CIMEC
 Cia. Ind. Pernambucana - Fabrica Camaragibe
 Cia. Indl. de Moveis Patente Faixa Azul - CINFA (Ex Soc. Ind. de Camas e Cadeiras Ltda. - SINCAL)
 Cia. Indl. Pirapama
 Cia. Indl. Vale do Siriji - CIVALE
 Cia. Indl. de Doces - CID
 Cia. Inds. Alimenticias de Pesqueira (Ex Cia. Ind. Alimenticia de Pesqueira)
 Cia. Integrada de Calcinacao e Mineracao
 Cia. Leira Lagoa de Itaenga - LAGITA
 Cia. Manufactora de Tecidos Norte - Fabrica Tacaruna
 Cia. Metalurgica de PE (Ex Soc. Indl. de Olinda)
 Cia. Moura Ind. de Separadores
 Cia. Nacional de Ferramentas - CNF
 Cia. Nacional de Moveis Laminados - COMOVEL
 Cia. Nordestina de Sucos
 Cia. Nordestina de Pesca - CONEPE
 Cia. Nordestina de Produtos Liofilizados
 Cia. Pernambucana de Borracha Sintetica - COPERBO
 Cia. Pernambucana de Materiais Eletricos - COPENA
 Cia. Pernambucana de Refratarios - CPR
 Cia. Produtos Pilar
 Cia. Siderurgica do NE - COSINOR
 Cia. Textil de Aniagaem
 Cocos e Derivados S/A Ind e Com. - CODESA
 Com. e Ind. Borca S/A Importacao e Exportacao - CIBSA
 Com. e Ind. de Embalagens Ltda. - CIEL
 COMIDEAL S/A Industrializacao de Alimentos
 Compagnie des Cables Sud Americaine - SUDAM
 Concreto Blocos do NE S/A Ind. e Com.
 Concreto Premix de PE S/A
 Confeccoes Duke S/A
 Confeccoes Klass Ltda. (Ex Cesar Jose Araujo)
 Confeccoes Londres S/A
 Confeccoes Torres S/A
 Copas Norte S/A - Fertilizantes e Defensivos
 *Costa Herculano S/A Ind. e Com. (Now Herculano S/A Ind. e Com.)
 Costa Pinto Indl. de Alimentos do NE S/A
 Cotonificio Capibaribe S/A
 Cotonificio da Torre S/A

Cotonificio Jose Rufino S/A
 Cotonificio Moreno (Ex Societe Cottonniere Belge-Bresiliene)
 Cotonificio Othon Bezerra de Mello S/A
 Cotonificio Victor Araujo
 Curtume L. Monteiro S/A
 Curtume Moderno S/A
 Curtume Nevada Ltda.
 *Curtume Santa Sofia (Now Irmaos Coutinho)
 Curtume Santa Maria S/A
 Curtume Souza Irmaos S/A
 Curtume Timbauba S/A - CURTISA
 Dafne Malharia Ltda.
 Datti Ltda. Ind. e Com. Moveis Plasticos
 *Deltex - M. Leite Prod. de Petroleos Ltda. (Now NOROLEO Ltda)
 Diamor S/A
 Dura Bem Inds. S/A
 Eleikeiroz do NE Ind. Quimica
 Eletromar NE S/A - ELNORSA
 Eletromecanica S/A - ELMESA
 Eletromoura S/A
 *Eletronica Xavante Com. e Ind. Ltda. (Now Xavante)
 E. Lucena Inds. Metalicas
 *Empresa de Produtos Quimicos e Fertilizantes - PROFERTIL
 (Now Produtos Quimicos e Fertilizantes - PROFERTIL)
 Equipamentos Hidraulicos S/A - EQUISA
 Estofados Esplendido do NE S/A
 Exportadora de Produtos Pernambucanos S/A
 Exportadora Coelho S/A - Com. e Ind. e Representacoes - ECSA
 Fabrica de Discos Rozemblit Ltda.
 Fabrica de Sacos Montanha Ltda.
 F. Conte S/A Ind. e Com.
 Ferragens Brasileiros Ltda. - FERBRASA
 Ferreira Costa & Cia.
 Ferreira & Cia. Ltda.
 Fiacao de Caruaru S/A - FICASA
 Fiacao e Tecelagem Ribeirao S/A
 Fiacao e Tecelagem Sao Jose S/A
 Fiacao Lugemar S/A
 Fiacao Microlite do NE
 Fibras do NE Ltda.
 Fieltex do NE S/A Ind. Textil
 Filex do NE S/A - Artefatos de Borracha
 *Fios Elasticos do NE S/A - FINESA (Now Fios Plasticos do Ne - FENESA)
 Fios Plasticos do NE - FENESA (Ex Fios Elasticos do NE - FINESA
 Ex Iraja Vieira)
 Ford (Ex Willys Overland do BR S/A Ind. e Com.)
 Forest do NE S/A - Fabrica de Condutores Eletricos
 Formiplac NE S/A
 Fosforita Olinda
 *Freitas e Guimaraes (Now Antonio Quintino Leite Filho)
 Frigorifico do NE S/A - FRINORTE
 Garanhuns Indl. S/A - GISA
 General Eletric do NE S/A - Produtos Eletricos
 Gesso Tamoyo Mineracao - GETOMISA

Glasurit do NE Ind. de Tintas
 Grafica Regis S/A
 Gypsum do NE Ind e Com. de Gesso Ltda.
 Harvey Hubbell (Ex H. K. Porter do BR)
 Henderit Ramos Ind. e Com. S/A
 Herculano S/A Ind. e Com. (Ex Costa Herculano S/A Ind e Com.)
 Hering Ne
 Hidromecanica de Vettori S/A
 *H. K. Porter NE do BR Equipamentos Eletrico Ltda. (Now Harvey Hubbell)
 Hora Norte Relogios e Instrumentos de Precisao
 Implementos do NE S/A - IN
 INDELTA S/A
 Ind. Armadoura de Pescado do BR - IARPE
 Ind. Ceramica Araujo (Ex Ceramica Araujo)
 Ind. de Alimentos Balanceados Ltda.
 Ind. de Azulejos S/A - IASA
 Ind. de Botoes do NE S/A - BONOR
 Ind. de Cabos de Aco do NE - ICANOR
 Ind. de Celulose e Papel S/A - INCELPA
 Ind. de Confeccoes S/A - ICOSA
 Ind. de Conservas Alimentares - CICANORTE
 Ind. de Contrucoes Metalicas Ltda.
 *Ind. de Bebidas Antartica do NE (Now Ind. Nordestina de Bebidas)
 Ind. de Implementos Agricolas S/A Implementos
 Ind. de Parafusos e Laminados Impala S/A
 *Ind. de Papeis do NE (Now NORDKRAFT)
 Ind. de Racoas Balanceadas de Carpina - IRCA
 Ind. de Rolhas Metalicas S/A
 Ind. de Telas Metalicas S/A - INTELA (Ex Ind.
 de Telas e Tecidos de Araramé)
 *Ind. de Telas e Tecidos de Arame (Now Ind.
 de Telas Metalicas S/A - INTELA)
 Ind. de Telecomunicacoes do NE S/A - ITM
 Ind. e Com. de Celulose e Papeis Pajeu S/A
 Ind. e Com. de Eletronica S/A
 *Ind. e Com. Djalma e Raimundo da Fonte Ltda. (Now
 Raymundo da Fonte Ind.)
 Ind. e Com. Locio S/A - INCOL
 Ind. e Com. Madereira S/A
 Ind. e Com. Mundial - Fabrica de Doces Mundial
 Ind. e Com. Oleos Araripina S/A - INCOASA
 Ind. e Com. Tintas Graficas Ltda.
 Ind. Eletronica Eudbert Ltda.
 Ind. Grafica Brasileira S/A
 Ind. Nordestina de Bebidas S/A - INORBE (Ex Ind de Bebidas Antartica
 Ex Ind. Pernambucana de Bebidas)
 Ind. Nordestina de Fechos - NORFESA
 Ind. Nordestina de Vidros S/A
 *Ind. Pernambucana de Bebidas Antartica -IPEBA
 (Now Ind. Nordestina de Bebidas S/A - INORBE)
 Ind. Pernambucana de Meias S/A
 Ind. Pernambucana de Metais
 Indl. Landen
 *Industrializadora Nordestina de Frutas Ltda. - INOFRA

(Now Souvenir Alimentos do BR S/A)
 Industrializadora de Plasticos do NE - CIPLAN
 Inds. Alimenticias Carlos de Brito S/A - Fabrica Peixe
 Inds. Alimenticias Garanhuns Ltda. - IAGA
 Inds. Alimenticias Maguary S/A
 *Inds. Alimenticias Palmeiron Ltda. (Now Palmeiron S/A
 Inds. Alimenticias)
 Inds. Coelho S/A
 Inds. de Ceramica Sororoca (Ex Agro-Indl. Sororoca)
 Inds. Minerva (Ex Soc. Inds. Minerva)
 Inds. Quimicas Sao Francisco
 Inds. Reunidas Cedro S/A
 Inds. Reunidas de Araripe - IRASA
 *Inds. Reunidas de Refrigeracao (Now Cia. Eletro
 Metalurgica do BR - NORLAR)
 Inds. Reunidas Garanhuns
 Inds. Reunidas Raymundo da Fonte
 Inds. Reunidas Sao Francisco S/A
 Inds. Romi do NE S/A
 *Iraja Vieira & Cia. (Now Fios Plasticos do NE - FENESA)
 Irmaos Coutinho Ind. de Couros (Ex Curtume Santa Sofia)
 *Isolamentos e Equipamentos de Refrigeracao
 (Now Maquinas e Equipamentos de Refrigeracao - MADEF)
 ISONOR - Ind. de Plasticos
 Itapesca Com. e Ind. Ltda.
 Itapessoca Agro-Ind. S/A
 Johnson & Johnson do NE Produtos Cirurgicos
 Jose Pereira do Nascimento (Ex Serraria Renato e Pereira
 Ex Renato e Pereira)
 *Jose Pires & Cia. (Now Ceramica Santa Clara)
 J. Torquato Ind. do NE Ltda.
 Kibon do NE Produtos Alimenticios Ltda.
 Laboratorio Farmaceutico do Estado de PE - LAFEPE
 Laboratorio Lopes Maia S/A Ind. e Com.
 Lanax S/A
 Lannark S/A Ind. Reunidas de Moveis e Colchoes
 *Laticinios Boa Vista (Now Antonio Quintino Leite Filho)
 *Laticinios Sanharo (Now Antonio Quintino Leite Filho)
 Laticinios Santamaria S/A
 Leon Heimer Ind. e Com. Ltda.
 Lipasa do NE Ind. e Com.
 Lonam do BR (Ex Lonex do BR)
 *Lonex do BR (Now Lonam do BR)
 Madeira Sintetica S/A
 Malafaia Ind. e Com. S/A
 Malharia Indl. do NE S/A
 Manilhas do NE S/A - MANESA
 Maquinas e Equipamentos de Refrigeracao Ltda. - MADEF
 (Ex Isolamentos e Equipamentos de Refrigeracao)
 Maquinas Piratininga do NE S/A
 Marano S/A
 Matadouro Frigorifico Ind. S/A - MAFISA
 Metalforte do NE Ltda.
 Metalgrafica do Norte (Also as Metalurgica do NE)

Metalurgica Camaragibe - MECASA
 *Metalurgica do NE (See Metalgrafica do Norte)
 Metalurgica Limas do BR
 Metalurgica Mattos Ltda. - METALMATTOS
 Metalurgica Olinda Fabril S/A
 Metalurgica Unida S/A - MUSA
 Microlite do NE S/A Ind. e Com.
 Mineracao Afonso R. Lima
 Mineracao Sao Severino S/A Com. e Ind. (Ex Cia. de Cimento
 Portland Goias)
 Mineradora Sao Jorge S/A
 Modulos S/A Armarios e Divisorias
 Monor Micromotores do NE S/A
 Moore Formularios do NE S/A
 Motogear Norte Ind. de Engranagens S/A
 Moveterras do BR Ltda.
 Navesul Estaleiro e Navegacao Atlantico Sul S/A
 Nitrosin NE Ind. e Com.
 Noraco Ind. e Com. de Laminados
 NOROLEO Ltda. (Ex Deltex- M. Leite Produtos de Petroleo Ltda)
 NE Grafica Ind. e Editora Ltda.
 NE Plasticos S/A - NORPLASA
 NE Quimica S/A - NORQUIMICA
 NORDKRAFT - Ind. de Papeis do NE (Ex Ind. de Papeis do NE)
 NORFIL S/A Malharia do NE
 NORGRAF S/A Impresos Especializados do NE
 NORTE PESCA Ind. e Com.
 Norte Tecnica Indl. S/A - NORTECA
 Oficina Ceramica Francisco Brennand S/A
 Orniex NE Ind. e Com. Ltda.
 Oxido do NE S/A - OXINOR
 PABAT - Produtos de Alta e Baixa Tensao S/A
 Palmeiron S/A Inds. Alimenticias (Ex Inds. Alimenticias
 Palmeiron Ltda.)
 Papeis Finos do NE S/A - PAFISA
 Papelao Ondulado do NE S/A - PONSA
 *Paratibe Ind. S/A Confeccoes - PISA (Now Paratibe Indl. S/A)
 Partibe Indl. S/A (Ex Paratibe Ind. S/A Confeccoes)
 PE Quimica -PERQUIMICA
 Perfil Plast S/A
 Pescas do NE S/A - PENESA
 Philips Eletronica do NE S/A
 Pinheiro Maia & Cia.
 Pirelli Norte S/A Ind. e Com.
 Plagon S/A - Plasticos Goyana do NE
 Plasticos Linil do NE
 Plasticos Nagassara S/A
 *Platispuma NE Ind. e Com. de Espumas Sinteticas (Now TRORION do NE)
 Polimetal S/A
 Produtora de Equipamentos Mecanicos e Eletricos Ltda. - PRODEME
 Produtos Eletricos S/A
 Produtos Quimicos e Fertilizantes - PROFERTIL
 (Ex Empresa de Produtos Quimicos e Fertilizantes)
 Pronorte S/A (Prod. Siderurgicos do NE)

Proteinas do BR Ltda.
 Protendidos do BR Ltda. - PROTENDIL
 Publicacoes e Informacoes Telefonicas Ltda. - PIT
 Purina do NE S/A
 Queijo Minas Ltda.
 Quimica Indl. Pernambucana - QUIPER
 Quimica Indl. do NE S/A - QUINOSA
 Raymundo da Fonte (Ex Ind. e Com Djalma e Raymundo da Fonte)
 Reciferal Com. e Ind. S/A
 Refinacoes de Milho NE Ltda.
 Refinaria de Acucar do Norte S/A
 Refrescos do Recife S/A "Coca-Cola"
 *Renato e Pereira (Now Jose Pereira do Nascimento)
 Renda Priori & Cia. Ltda.
 Rhodia NE S/A Inds. Texteis e Quimicas
 Rique, C. A. & Cia. Ltda.
 Rocha Ind. e Com. - RICOL
 *Rodas Arcaro do NE S/A (Now Borlem)
 Rodoviaria NE Implementos para Transporte Ltda.
 Rolhas Metalicas do NE S/A (Crown Cork)
 Ron Bacardi S/A
 SABAP do NE - S/A Brasileira de Artefatos Plasticos.
 S/A Brasileira de Ind. Otica - SABIO
 S/A Cartonagem Indl. - SACI
 S/A Confeccoes Brasileiras
 S/A Ind. de Celulose do NE - SACRAFT
 S/A Tecnica Ind. de Apipucos
 S/A Tubos Brasilit
 SADOKIN do NE S/A Ind. Eletrica
 Santista Ind. Textil do NE S/A
 Santo Amaro Ind. de Ladrilhos Ltda.
 Sarabor S/A Regenerador de Artefatos de Borracha
 *Serraria Renato e Pereira (Now Jose Pereira do Nascimento)
 Silber Metalurgica (Ex Campos Moreira S/A)
 Sentinela Confeccoes S/A
 Sentinela Ind. Textil do NE
 Siderurgica Aco Norte S/A
 SIMAB NE S/A Ind. e Com. Racoes para Bovinos
 SINWAL S/A Ind. de Marmores e Granitos
 *Societe Cottoniere Belge-Bresilienne (Now Cottonificio Moreno)
 Soc. de Estudos para o Desenvolvimento de Plastificacao
 Soc. de Moagem do Recife
 Soc. Importadora Ltda.
 *Soc. Ind. de Camas e Cadeiras Ltda. - SINCAL
 (Now Cia. Indl. de Moveis Patente Faixa Azul - CINFAL)
 *Soc. Ind. de Olinda - SINO (Now Cia. Metalurgica de PE)
 *Soc. Inds. Minerva Ltda. (Now Inds. Minerva)
 Soc. Pernambucana de Artefatos de Construcão
 Sotave do NE S/A Ind. e Com.
 Souvenir Alimentos do BR S/A (Ex Industrializadora
 Nordestina de Frutas Ltda. - INOFRA)
 Springer do NE Eletronica e Refrigeracao
 Stolco do BR Ltda.
 Tecelagem de Etiquetas Guerry

Tecelagem Parahyba do NE S/A (Ex Algodoeira Uniao do BR)
Tecelagem de Seda e Algodao de PE - TSAP
Telas e Metais Perfurados - PERNORTE S/A
Teles, Maranhao & Cia. Ltda.
Telecomunicacoes de PE S/A
Termomecanica do NE Ltda.
Textil Catarinense do NE Ltda. - TECANOR
Tintas Coral do NE S/A
Tintas Diamante Ind. e Com. S/A
Tintas Graficas - PROGRAF
Tintas Reflex do NE S/A
*Tiletron Ind. de Plasticos Ltda. (Now Tiletron
Ind. de Resinas Sinteticas)
Tiletron Ind. de Resinas Sinteticas (Ex Tiletron
Ind. de Plasticos Ltda.)
Trorion do NE (Ex Platispuma)
*Tubos Guararape S/A (Now Tupy Guararape)
Tupy Guararape (Ex Tubos Guararape)
Uniao de Bebidas Ind. e Com.
Uniao Fabril do Recife S/A Ind. e Com.
Uniao Industrial de Artefatos de Papel - UNIART
Uniao Nordestina de Fiacao S/A
Usina Putamy S/A
Usina Sao Jose S/A
Valisere do NE S/A Textil e Confeccoes
Vidro Neutro do NE S/A - VINESA
Volnor Ind. e Com. S/A (Ex Wolf do NE S/A Ind. e Com.)
*Willys Overland do BR S/A Ind. e Com (Now Ford)
*Wolf do NE S/A Ind. e Com. (Now Volnor Ind e Com. S/A)
Xavante (Ex Eletronica Xavante Com. e Ind. Ltda.)

Appendix D

ACRONYMS

ALIDE	Asociación Latinoamericana de Instituciones Financieras de Desarrollo.
BNB	Banco do Nordeste do Brasil, Fortaleza.
BNDE	Banco Nacional de Desenvolvimento Economico.
CAEN	Curso de Mestrado em Economia, Universidade Federal do Ceara.
CNE	Conselho Nacional de Estatística.
CNG	Conselho Nacional de Geografia.
CONDEPE	Conselho de Desenvolvimento de Pernambuco.
DIN	Departamento de Industrialização, also Departamento de Industria e Comercio, SUDENE, Recife.
DIPER	Companhia de Desenvolvimento Industrial de Pernambuco.
EIAP	Escola Interamericana de Administracao Publica, FGV, Rio de Janeiro
FGV	Fundacao Getulio Vargas.
FIEP	Federacao das Industrias do Estado de Pernambuco.
FINOR	Fundo de Investimentos do Nordeste.
FUNDINOR	Fundacao para o Desenvolvimento Industrial do Nordeste.
GTDN	Grupo de Trabalho para o Desenvolvimento do Nordeste.
IBGE	Instituto Brasileiro de Geografia e Estatística.
ILO	International Labour Organization, Geneva.
IPD	Primeiro Plano Diretor.
IIPD	Segundo Plano Diretor.
IIIPD	Terceiro Plano Diretor.
IVPD	Quarto Plano Diretor.
II PND	Segundo Plano Nacional de Desenvolvimento.
I PND	Primeiro Plano Nacional de Desenvolvimento.
IPEA	Instituto de Planejamento Economico e Social.
INPES	Instituto de Pesquisas.
IPLAN	Instituto de Planejamento.
LARR BR	Latin American Regional Reports Brazil.

MINTER Ministério do Interior.
NAI Nucleo de Assistencia Industrial.
PAEG Plano de Acao Economica do Governo, 1964-66.
PE Pernambuco.
PEA Populacao Economicamente Ativa.
PED Plano Estrategico de Desenvolvimento.
PIN Plano de Integracao Nacional.
PIMES Curso de Mestrado em Economia, UFP, Recife.
RMA Recife Metropolitan Area.
SERPE Superintendencia dos Servicos e Estatística de Pernambuco.
SUDAM Superintendencia de Desenvolvimento da Amazonia.
SUDENE Superintendencia de Desenvolvimento do Nordeste.
UCLA University of California at Los Angeles.
UFP Universidade Federal de Pernambuco, Recife.

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NOTE:

The bibliography is divided into five sections: (1) Books and Articles, (2) Statistical Sources and Government Reports, (3) Maps and Gazetteers, (4) Bibliographies, and (5) Sources not Consulted. Furthermore, section (2), Statistical Sources and Government Reports, is divided in four subsections according to the agency issuing the reports: IBGE, SUDENE, Pernambuco, and Others. An * denotes the entry is not referred to directly in the text, though it has been consulted.

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