The evaluation of rural development projects using the social accounting matrix approach

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The aim of this paper is to contribute to the evaluation of rural development projects (RDPs) by devising a Social Accounting Matrix (SAM) in which the main economic goals of these projects, such as self-sustaining growth, increasing employment opportunities, equitable distribution of incomes and the secondary effects affecting the above variables, can be better understood and assessed. To accomplish this, we have set out the principles, methods and data requirements involved in designing an adequate SAM for evaluating RDPs. The validity of this approach as a classificatory data system and as an analytical tool was then tested empirically through a case study in Northeast Brazil. The application showed that most of the economic transactions among and within different socio-economic groups and production activities in a project target area can be ordered and accounted for in a consistent and systematic way. Thus, the SAM approach provides a picture of the economic structure of a target area economy which is essential as a policy diagnosis to assess, modify or establish rural development strategies. Also, the statistical information contained in the SAM provides the necessary base to estimate a certain range of economic models which are powerful analytical tools for simulating different policy scenarios and/or disentangling project-induced effects from autonomous change.

1. Introduction

Over the past decades a wide variety of government initiatives and approaches in agricultural and rural development have been promoted in less developed countries (LDCs). In the 1960s most of these strategies were production-orien-

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ted efforts based on the implementation of large-scale, capital-intensive projects such as dams and distributory canals as part of irrigation projects, promotion of livestock, fisheries, forestry and perennial crops projects.

The limited success of these growth-oriented strategies in bringing about sustained increases in per capita output and income, expansion of productive employment and greater equity in the distribution of the benefits of growth, led donors and third world governments to turn attention to rural development programmes and projects (RDPs) with broader objectives and directed to specific target groups and areas. Although these so-called new-style or poverty-oriented projects may differ from one LDC to another, they all share some common features. These features include: (i) the identification of the rural poor as the principal client, and (ii) a broad set of goals, such as employment generation, increased agricultural productivity, augmented income and equitable distribution thereof, and greater access by rural poor to public services (UN, 1980). In order to achieve this broad set of goals, these projects are generally complex, containing several complementary components. They include directly productive components (irrigation, rural credit, technical assistance and rural extension, agricultural research), combined with investment in infrastructure and social services (rural roads and electrification, health, education, etc.). Good examples of these programmes are: the Investment Programme for Rural Development in Liberia, the Kenya Special Rural Development Programme, the Lilongwe Land Development Programme in Malawi, the Programme for Development of Integrated Areas (Polonordeste, already extinct) and the Programme to Support the Small Rural Producers (PAPP) in Northeast Brazil, among many others.[1]

Evaluation of past RDPs indicate that most of them, with rare exceptions, have had limited success in achieving the whole set of objectives and targets for which they were originally designed. Most of the RDPs were unable to increase agricultural production rapidly enough, having expanded social services much faster. Also, these evaluations indicate that the RDPs affect not only intended levels of output, input, but, at the same time, they induce powerful secondary effects (SEs) which are of major relevance in determining the pace and direction of progress towards the main goals frequently attributed to RDPs, namely, autonomous growth with equity and social assistance to the rural poor.

The limited success of the RDPs, together with the need for more informed planning at all levels to overcome incomplete knowledge and uncertanties of the effects of rural policies, have resulted in a growing emphasis for better and more appropriate information systems for monito-

[1] The design and implementation of these projects have been stimulated by grow-with-equity theoretical and policy debates initiated in the early 1970s (see, for example, I. Adelman, 1975; H. Chenery et alii, 1974; J. Fei et alii, 1979 and ILO, 1972).

ring and evaluation of RDPs. With regard to this pressing need, the main purpose of this paper was to device a methodological framework in which the desired targets of these projects and the project-induced effects can be better understood and fully assessed.

It is argued in this paper that the desired targets and objectives of RDPs can be better assessed within a regional perspective. That is, the understanding of income generation and its distributional pattern, employment creation alternatives, possibilities of autonomous growth and the secondary or multiplier effects affecting the above variables, is only possible if all transactions among and within institutions, regional production activities and the magnitude of the transactions between a project area and the rest of the national economy (or rest of the world) can be traced through. Based upon this argument, a social accounting matrix (SAM) approach was chosen and its format adequated to both the particular conditions that characterize project target areas and the specific project objectives and goals to which the evaluation process is directed. The empirical viability of the methodological approach proposed was demonstrated through the construction of a regional SAM for the Brejo Paraibano area in Northeast Brazil, where an Integrated Rural Development Project (IRDP) was implemented at the time. The statistical base of this SAM was then used for modelling purposes in order to evaluate the impact of some actions of the Brejo IRDP.

This paper is organized in seven sections. Section 2 shows the main features of the SAM approach and its accounting rationality. Section 3 sets out the classificatory criteria necessary to build a SAM for evaluating RDPs. The appropriate disaggregation and classification of the Brejo-SAM, as well as the methods and data sources necessary for its estimation, are presented in section 4. Analysis of the Brejo economy through the SAM is presented in section 5. Impact analysis based on the Brejo-SAM is carried out in section 6. Finally, in section 7 we present the main conclusions of this work.

2. The social accounting matrix (SAM) approach

Historically, the design of a statistical information system like SAM has been evolved from the combination of two approaches: the Keynesian model of the economy concerned with broad aggregates (production, income, expenditure and accumulation) and the input-output model of the structural interdependence of production in the economy, which can be traced back to François Quesnay (1758) in his "Tableaux Économiques" (W. Miernyk, 1965; Pyatt et alii, 1977).

Apart from other economists who contributed to the theory of general equilibrium and economic interdependence — notably Leon Walras (1874)[2] —, it was Wassily Leontief in the 1930s who developed a general theory of production based on the notion of economic interdependence. Also, he gave empirical content to this theory in his input-output table for the American economy (1936).

The first SAM was produced within the Cambridge Growth Programme initiated by Richard Stone and Alan Brown (1962). The official consolidation of the input-output model and the matrix presentation of national income accounts came about in the revised system of national accounts proposed by the United Nations in 1968 (Unso, 1968).[3] This revised system of national accounts (SNA) has been invaluable as a basic guide for social accounting and has inspired most of the SAMs developed in the last 15 years. The principal architect of the SNA was R. Stone, who made a truly significant contribution to the extension of matrix accounting to the social, demographic and economic fields. Also, he has demonstrated how a matrix accounting system can be useful for organising data and be used as a basic tool for macroeconomic modelling (see Pyatt & Thorbecke, 1976; Cambridge, 1962). More recently, Pyatt and his associates — among other practitioners — have constructed SAMs for Iran (1973), Swaziland (1977), Sri Lanka (1977) and Malaysia (1980).

Basically the SAM is structured around an input-output table including also accounts for consumption and production patterns, exports, imports, investment and savings. Moreover, depending on the particular issues of interest and the data available, a SAM may include more detailed information on import patterns, income distribution, tax structure and monetary variables, among others. The SAM's design is represented for a set of double entry accounts arranged in matrix form. By convention the various receipts of each and every account are represented by an ordered row and the corresponding expenditure by a similary ordered column. In this way, the whole comprises a square tableau, where each cell (*ij*) defines a particular transaction or transfer within the economy. For example, an entry in row *i*, column *j*, represents receipts in account *i* from account *j*, or alternatively, expenditures from account *j*, which are paid to account *i*. So, the row in which the flow is placed identifies the account to which it is destined and the column shows the account from which the flow originates. This array

[2] The model developed by Walras shows interdependence among the producing sectors of the economy, and the competing demands of each sector for the factors of production (Spiegel, 1952).

[3] The first international guidelines for national income accounting was laid down by the United Nations in 1953.

provides a picture of all transactions in the economy during a period of time, and in so doing, it also reveals something of the structure of the economy.

3. A SAM for evaluating RDPs

The range of economic policies which can be assessed using the SAM approach depends strongly on the classification and the extent of disaggregation adopted in it. Thus, the design of an adequate accounting framework for evaluating RDPs requires the establishment of classificatory criteria. Since no particular SAM classification and disaggregation could fit the wide range of possible types and target area conditions, the classificatory scheme to be discussed next should be seen as a general guideline which can be accommodated to specific project target and area conditions. In any case the final format of a particular SAM will be determined by a host of factors such as costs and resources, specific project objectives and target area conditions, data availability and modelling purposes.

3.1 Production activities

According to Pyatt et alii (1977), a main guiding principle in any production classification is to define a separate category for any activity which is reasonably large or likely to become large, provided also that it has a distinct input structure, or is distinguished in some other significant way from other activities. In relation to our purposes, these criteria are met by the main agricultural activities carried out in the project area "before" the advent of the project differentiated by their input structure. The classification should also include a detailed disaggregation of those activities carried out by the chosen target groups of the project.

The pattern of activities "before" the project will probably change gradually as the activities promoted by the project (or by other exogenous factors) are being adopted by the target groups. Thus, if our interest is to trace distributional and employment effects of a given production structure for various target groups, the proposed classification scheme should take into consideration both the initial pattern of agricultural activities and its change over time. Also, this scheme should capture the usual variation of the cropping patterns due to agroecological conditions and land tenure status which is common in rural project areas.

Since we are particularly interested in measuring multiplier effects arising from interindustry and final-demand linkages, our classificatory scheme should also encompass those activities carried out in the non-farm sector. The classification and disaggregation of these activities will strongly

depend on the data available and on the classifications adopted in the available secondary sources of data. If data is made available through sampling surveys, the general recommendations is to classify it according to differences in production technology, the distribution of sectoral income among households and the market which they serve.

Non-farm activities can be encompassed in the following major categories: rural industry (or agroindustry), urban industry, construction, commerce and marketing, transport, private and public services. Since part of the agricultural output generated in a target area is usually processed locally, a comprehensive disaggregation of the sectors processing this output is particularly relevant to establish the corresponding linkages.

Given the integrated and comprehensive design of the RDPs, the government plays a major role in providing packages of production services and complementary economic and social infrastructure in order to achieve the established productive and social targets. This compels us to set out an adequate classification an disaggregation of the government's public expenditure allocated through the different projects' components. These can be subdivided and included in our classification system in the following categories: a) expenditure on farm production services, which, depending on the project, may include: rural extension, agricultural research, marketing and storage, etc; b) expenditure on economic and social infrastructure and related services, which may include: rural roads, education and training, health and sanitation, and others.

On the revenue side, the government receives payment of direct, indirect and other local taxes (licence and fees, property taxes and the like) from the target and non-target institutions. According to their importance, these taxes can be classified in aggregated terms or further disaggregated.

3.2 Institutions

The disaggregation of the institution's current account should be in line with the specific purposes of the RDPs. In other words, it is necessary to establish a comprehensive disaggregation which separately identifies those which are the specific project targets, as well as those which play a relevant role in the regional economy and interact with the target group.

In general, the institutions making up a project area can be subdivided into three major categories, namely, government, firms and households: i) The government account can be disaggregated into federal, state or municipal branches. This disaggregation is specially important when there exists a well defined pattern of transactions between both federal and state areas of government, and when the purpose is to analyse or assess the state or federal fiscal policies in the area. For our purpose, this subdivision is of

public expenditure upon the project area, independently of these expenditures being of state or federal origin; ii) firms or non-farm enterprises can also be included within this classification. The decision to include this category and to further subdivide it into a more detailed disaggregation will depend strongly on: (a) data availability (or the necessary financial and human resources to collect it) and (b) the inclusion or not in the project of a non-farm component with specific target firms to be benefited; iii) The category of households should be further subdivided if we want to capture the project's effects upon income generation and its distribution. Accordingly, it is important to have a detailed household disaggregation which includes not just the project target groups but also the not-target groups — since the project must inevitably have implications for the latter groups as well (project's leakages, for example).

The total number of households in a project area can be split up into two broad categories, rural and urban households. Since RDPs have no specific objectives relating to urban households, this category is placed as such in our classificatory scheme. By contrast, the rural sector should be subdivided into further categories if we want to assess the project's effects upon the different socio-economic groups making up this sector. The first subdivision refers to those target and non-target groups which are generally defined by the project. Non-target groups, who in most RDPs are made up of medium and large landowners, are treated as such without further disaggregation. Whether the target groups have been adequately defined by the project or not, these should be classified by income levels. The criterion for this is given by the access to productive land (landless operators, renters, etc.), and quantity and quality of the land operated by the target group (farm size and agroecological conditions).

3.3 The capital and the rest of the world accounts

The institution's capital account should be combined in a consolidated capital account. This avoids estimating flow of funds among households, firms and government for which no reliable information exists in project areas. As we are interested in the performance of the project area as a whole, the rest of the world account allows us to identify the magnitude of the transactions between this region and the rest of the world (which includes the rest of the national economy). The analysis of these flows over time will show us the path of dependence and the possibilities of autonomous growth of this region. In other words, the project area is treated as a small open economy surrounded by the rest of the national economy with which most of the transactions are carried out. Table 1 presents a general SAM based upon the criteria discussed above.

Table 1
The proposed SAM for evaluating RDPs

Receipts \ Expenditures					Project area activities: Farm, j = 1,2...n	Project area activities: Non-farm	Institutions: Households: Urban	Institutions: Households: Rural: Non-target	Institutions: Households: Rural: Target, k = 1,2...n	Institutions: Government	Rest of the world (exp.)	Combined capital account (investment)	Gross output value
Project area activities	Non-farm j = 1,2...m Farm	Agricultural activities carried out by the target groups in t_o and project promoted activities in t_{o+j} Main agricultural activities carried out by the non-target groups Other agriculture Agro industry Urban industry Distributive trade Private services Public services Other non-farm activities			x_{ij} x_{ij} ..... x_{ij} $x2_j$ Intermediate demands x_{ij} ..... x_{ij}		C_{11} ..... C_{ik} Household demands C_{ij} ..... C_{ik}			G_1 Government purchases C_i	E_1 Exports E_i	J_1 Output to investment J_i	X_1 x2 x_i
Institutions	Households	Urban			V_{ij} ..... v_{ij} Value added to household and government V_{k1} ..... V_{kj}		H_{ij} ..... H_{ik} Inter-households transfers H_{kj} ..... H_{kk}			V_{1g} Government payments to households V_{kg}	R_1 Remittances from abroad R_k	———	Y_1 Household total income y_k
		Rural	Non-target										
			Target	Explicit target groups given (or not) by the project considering: access to land quantity and quality of land agroecological conditions									
	Government				V_{g1} ..... V_{gj}		T_1 ..... T_k			-	-	-	G
Rest of the world (imports)					M_1 ..... M_j		M1 ..... M_k			-	-	MI	M
Combined capital account (savings)					.....		S_1 ..... Sk			S_g	-	-	S
Gross input value					X_1 ..... X_j		Y_1 ..... Yk			G	R	I	-

Obs.: the subscript $i,j = 1,2 \ldots n$ denote the sectors of production and $k = 1,2, \ldots n$ denote the class of household: x_{ij} = value of purchases of intermediates by sector j from sector i (intermediate demand), V_{kj} = payments of value added to households of type k from sector j, C_{ik} = expenditure by household of type k on output of sector i, G_i = expenditure by government on output of sector i, E_1 = value of exports of output of sector i, J_i = value of investment demand for output of sector i, X_i = value of gross output of sector i, V_{gj} = payments to government of value added of sector j, G = total revenue received by the government, H_{kk} = inter-household transfers, M = total value of imports, M_j = value of imported intermediates purchased by sector j, M_k = expenditure on imported goods by household of type k, MI = imports of capital goods, T_k = tax payments by household of type k, S = total savings, S_k = savings by household of type k, S_g = governmental savings, P_k = remittances from outside the target area received by household of type k, R = total remittances from abroad, I = total investment, Y_k = total income of household type k.

4. The Brejo-SAM

The Brejo project area is located in the eastern part of the State of Paraíba in Northeast Brazil. This State, with a population of 2.8 million, is one of the smaller and poorer States in Northeast Brazil. Two-thirds of the State's total area falls within the drought-affected region of the Northeast and its economy is mainly dependent on agriculture. Beans, corn, pineapple, banana, manioc, rice, cotton, sisal and sugar cane constitute the major crops, while livestock and fishing also figure significantly.

The Brejo area contains a total population of 186,218 (1980 FIBGE figures), of which 68.4% is rural. This represents 6.6% of the State's total population and 9.6% of its rural population. The geographical project area covers 14 municipalities with a total of 158,100 ha or 2.81% of the State's land area. The municipalities making up the Brejo area are the following: Areal, Esperança, Lagoa Seca, Montadas, Puxinana, Lagoa Nova, Arara, Areia, Bananeiras, Borborema, Pilões, Pirpirituba, São Sebastião de Lagoa de Roa and Serraria.[4]

The methodological guidelines laid down in the above section and the analysis of the regional economy of our case study — which includes the setting out of the main features of the Brejo Integrated Rural Development Project (IRDP) — provided us with the basic empirical support and classificatory guidance for the construction of the Brejo-SAM for 1975, *i.e.*, "before" the project situation.[5] Starting at a more aggregate level, the basic structure of the Brejo-SAM is made up of four major set of accounts: institutions, production activities, a consolidated capital account and the rest of the world. Despite the importance of the above aggregates in their own right, some of them should be moved to a more disaggregate picture if we want to use them for evaluating purposes. According to our classificatory scheme, both the combined capital account and the rest of the world account (which includes the rest of the national economy) can be placed as such without further disaggregation. However, the accounts for institutions and production activities need to be comprehensibly disaggregated in order to identify those institutions and production activties which are the specific project targets, as well as to include (in more aggregate form) those institutions and activities which play a relevant role in the Brejo economy.

[4] Detailed information about the Brejo project is presented in IBRD (1978).

[5] The Brejo IRDP's activity started in 1976.

4.1 Institutions

The accounts for institutions comprise two major categories: government and households. Since it is not our purpose to assess fiscal policies in the Brejo area nor to analyse the pattern of transactions between the local and the state and federal levels of government, the government account is included in aggregated form.

The household category needs to be further subdivided to capture the project's impact upon income and its distribution. Accordingly, the Brejo-SAM presents a detailed household classification which includes not only the project target group but also those non-target households, since the project must inevitably have implications for other groups as well. The total number of households in the Brejo area are classified into two broad categories, urban and rural households. The former category, which represented 26.7% of the Brejo total population in 1975, is placed as such in the Brejo-SAM without further disaggregation.

By contrast, the rural households should be further subdivided in order to clearly identify the different groups making up the farm sector. The first sub-division separates those households which are the project's target from non-target households. The former group is distributed into three different agroecological sub-areas (potatoes, cotton and citrus) with particular cropping patterns and for which specific technical packages were to be promoted by the project. The non-target group has been defined as those landowners who own more than 50 ha in the cotton and citrus sub-areas and more than 25 ha in the potato sub-area. This category — which is a single row/column in the Brejo-SAM — is made up of 530 landowners who control about 56% of the Brejo's total agricultural land. According to the appraisal report (IBRD, op. cit.), the project is oriented toward a target group of 11,690 producers of whom 8,600 (14,634) are small and medium-scale landowners and 3,100 (4,966) landless operators who rent or sharecrop land. Of the total target group, the project expected to benefit directly (credit coupled with technical assistance) 7,380 producers — 6,150 owners and 1,230 landless operators.[6]

As mentioned, to account for the target group's differences the Brejo-SAM has included the particular agroecological conditions which are reflected in the Brejo's sub-areas (potatoes, cotton and citrus) and considered two categories of producers within each sub-area: landowners who hold up to 19.99 ha in the potato sub-area and up to 49.99 ha in the cotton and

[6] The agricultural census data (in brackets) shows that the appraisal report underestimated the number of both owner-occupiers and landless operators. The reason for this underestimation is that at the time of the appraisal (1976), the agricultural census was not available (published in 1979) and the World Bank's mission had to resort to the cadastral survey of agricultural properties provided by the National Institute for Colonization and Land Reform (Incra). While providing reliable information for the number of landowners (who should register their properties in this Institution), this source fails to include all the tenants, sharecroppers and occupants.

citrus sub-areas, and landless operators, including tenants, sharecroppers and squatters. Since most of the producers of the former category hold less than 10 ha in the cotton and citrus sub-areas (92 and 93%, respectively), and less than 5 ha in the potato sub-area (82%), the farm size strata given by the project have been split up into smaller strata. In each sub-area we have classified the target group of landowners into two strata — in the cotton and citrus sub-areas those holding up to 9.99 ha and from 10 to 49.9 ha and from 5 to 19.99 ha, respectively. The strata limit of 19,99 ha has been chosen in the potato sub-area, instead of the 25 ha (as defined by the project), because the stratification of farms given by the agricultural census does not use this boundary in its breakdown. On the other hand, the category of landless operators has been included as such in the Brejo-SAM without further disaggregation. This choice is not just because the project includes the tenants, sharecroppers and squatters in one category (landless operators), but also because of the relative homogeneity of these producers in terms of average farm size, cropping pattern and the productive organisation within each sub-area. In addition, and according to the observation of the Sudene/World Bank Survey (Kutcher & Scandizzo, 1981), the dividing line between sharecroppers and tenants is not clear, since most sharecroppers in the Northeast tend to describe themselves as tenants, even though the rent they pay is a portion of the harvest.

Finally, the Brejo-SAM includes a classification for landless labourers who the project expects to benefit indirectly through increased employment opportunities. In total, the institutions account of the Brejo-SAM comprises 13 sub-accounts, one for government, one for urban households and 11 for rural households, in which our framework places particular interest.

4.2 Production activities

As indicated earlier, the main guiding principle in classifying production activities is to define a separate sector for those agricultural activities carried out by the target group which are large or likely to become large (due to the project) and present a distinct input structure. Also, this classification should encompass the main agricultural activities carried out by the non-target groups, and those non-farm activities which are either closely linked to the agricultural sector or of significant regional economic importance.

In confronting the above recommendations with our particular data constraints, 13 production activities have been encompassed in the Brejo-SAM plus a "dummy" sector to include unallocated inputs, expenditure items and investments from non-farm activities not considered in the classification adopted.

From the description of the Brejo agricultural pattern (taken from the Agricultural Census) and the information provided by the appraisal report (IBRD, op. cit.), it is possible to identify the eight main activities carried out by the target group and/or those likely to become larger; they are: manioc, beans, potatoes, cotton, bananas, oranges and dairy cattle. This last activity has been embodied in the "livestock" sector, which includes various types of animals. On the other hand, the main agricultural activities carried out by the medium to large farmers are: sugar cane, cattle raising (included in the livestock sector) and bananas. The technology used in each of the above activities is rather homogeneous, *i.e.*, there is no marked difference in the input structure of a particular crop — for example, irrigated and rainfed sugar cane — which would demand a separate sector. The small-scale producers who grow most of the subsistence crops (beans, manioc, corn), and some of the cash crops (potatoes, cotton, bananas), do not use modern inputs like selected seeds and fertilizers, and they do not have any tradition in soil conservation practices. Although there are a few technically advanced medium-scale farmers who applied improved technology (mainly in potatoes), their participation in input purchases and output sales is insufficient to deserve a separate category in our classification.

Apart from the above activities, where the characteristics of the product are clear-cut, we have included an "other agriculture" sector which represents a ragbag of more than thirty agricultural products or activities.

Brejo's processing activities have been split up into two sectors, "on-farm processing" and "off-farm processing". This classification is not ideal, since it would be better to separate out those activities processing each individual product. Unfortunately the classification and tabulation adopted in both the agricultural and industrial census for the state of Paraíba compelled us to adopt the above classification. According to the agricultural census, "on-farm processing" represents the transformation and processing of agricultural produce carried out in rudimentary farm installations. On the other hand, the processing of agricultural produce carried out in better-equipped installations, whether or not located in rural areas, has been classified as "off-farm processing" or industrial production in the census' terminology. Despite the limitations imposed by the census' classification, "on-farm processing" in the Brejo case can be considered as the "manioc processing sector", since 98.5% of its total output value corresponds to cassava flour and cassava starch.

The "off-farm processing" sector encompasses a wide range of activities. Most of the establishments (89 %) included in this category are dedicated to food processing and they provide the largest share of gross output value added generated in this sector. The other non-farm activities carried out in the Brejo region have been classified in aggregate form. The "distributive

trade" sector encompasses the broad composition of wholesale and retail activities plus transport costs. The composition of the "services" sector is broad, including accommodation and lodging, reparation, maintenance and completion, personal hygiene, entertainment, radio broadcasting and TV, among a wide range of other activities. However, it is important to call attention to the fact that in this sector — as in the other productive activities discussed above — are included not just those privately-owned establishments (which represent the bulk of the total) but also a small number of establishments owned by the government. Unfortunately, the census data does not allow us to separate them out at municipal level. Therefore, it has been assumed that production activities pay value added exclusively to the urban and rural households. Furthermore, services which involve the provision of public goods — health, education, sanitation, etc. — for which little or no charge is made are also ignored in the census data and are therefore not included in the Brejo-SAM. With regard to this drawback, it is important to note that due to the scope and importance of government activities — particularly when a project aiming to provide health, education, sanitation, roads and irrigation, among other services, is to be implemented — they ideally should be included within the production boundary. The reason for this recommendation is that government sectors meet not just final demand but also intermediate demand.[7]

Finally, the "dummy" sector has been included to accomodate unallocated inputs and final demand items from those activities which, because of their economic unimportance or data constraints, have not been considered explicitly in the Brejo-SAM. For instance, the cost of electricity or local banking charges (a sector not included in the SAM) paid by the Brejo production activities and/or institutions are allocated to the "dummy" sector.

It is important to mention that the Brejo-SAM has been estimated using a variety of secondary data sources. The most important were the censuses of production (agriculture, industry, commerce and services) for the State of Paraíba (FIBGE, 1979) which not only present detailed data at the state level but also by municipality. This allowed us to obtain specific data for the 14 municipalities which constitute the Brejo area. Another set of important data — although not specific to the Brejo region — was provided by the 1974/75 Endef survey (Estudo Nacional de Despesa Familiar-FIBGE, 1978) of household expenditure and nutrition. Endef collected data from 55,000 households throughout Brazil, of which 15,675 were in the Northeast and of these 5,947 were rural. In addition, various research reports of the Brejo area and publications from the State and Federal government

[7] In the Brazilian input-output matrix (FIBGE, 1979), for example, the sectors providing public goods and services have been placed in the final demand sector, *i. e.*, just purchasing from the activities included in the input-output quadrant of the matrix.

agencies were important sources of secondary material. However, despite the low cost in obtaining data from secondary sources, they rarely yield direct estimates of the SAM transactions. This being so, we had to generate the required set of values for the cells of the Brejo matrix using a variety of information and estimation procedures. A fully detailed discussion is presented in Buvinich (1985).

5. The Brejo economy pictured by the SAM

The application of the above classification and disaggregation criteria resulted in the full SAM presented in table 2.

5.1 Aggregated accounts

Table 3 shows consolidated accounts for the Brejo economy which have been derived from table 2. It can be observed that the regional gross output value (GOV) was Cr$ 322.06 million (row 1, column 6) or US$ 37.76 million, implying that per capita GOV was US$ 213. Of the total Brejo GOV, Cr$ 70.25 million (US$ 8.67) represented outlays on domestically produced intermediate goods (1.1) and Cr$ 29.51 million (US$ 3.64) related to purchases of imported intermediates (4.1). Therefore, regional value added (gross of depreciation) in market prices was Cr$ 222.3 million (US$ 27.44) or 69% of total gross output. In other words, Brejo's per capita gross domestic product was US$ 147.

In addition to value added payments from production activities, households received Cr$ 2.98 million from the government (1.3) as pensions and allowances. Interhousehold tranfers amounted to Cr$ 3.76 million (2.2) and remittances from relatives living outside the Brejo area (2.4) were ignored. Accordingly, the total income accruing to households was 222.3 + 2.98 = Cr$ 225.28 million. To avoid double-counting, interhousehold transfers have been left aside.

After paying Cr$ 3.75 million in rates and taxes to the government (3.2), households spent 52% (Cr$ 114.9 million) (1.2) of their disposable income on domestically produced goods. Of the remaining Cr$ 102.88 million, Cr$ 70.23 million (4.2) was spent on imported consumer goods and Cr$ 36.41 million was saved (5.2), which represents a savings rate of 16.4% of disposable income.

As could be expected, the Brejo economy was highly open to trade with the rest of the national economy (1.4). Export of commodities represented 40 and 58% of Brejo's gross output and gross domestic product, respectively. In contrast to intermediate demand (1.1), household consumption (1.2) and exports (1.4), which were important users of domestic gross output,

Table 2
The Brejo social accounting matrix for 1975 (thousands of cruzeiros)

Receipts \ Expenditures									1 Potatoes	2 Beans	3 Manioc	4 Cotton	5 Oranges	6 Bananas	7 Sugar cane	8 Livestock	9 Other agriculture	10 On-farm processing
1	Regional activities	Potatoes							1,079.6									
2		Beans								718.1								
3		Manioc									2,263.7					3,181.1		13,338.6
4		Cotton																
5		Oranges																
6		Bananas																
7		Sugar cane													1,443.9			
8		Livestock																13.7
9		Other agriculture														648.0	1,504.0	629.0
10		On-farm processing																
11		Off-farm processing																
12		Distributive trade							58.9	258.4	553.9	54.7	51.0	133.6	587.4	325.0	509.4	207.4
13		Services																
14		Dummy sector							139.3	930.0	1,312.9	809.9	122.0	503.6	2,772.4	688.6	1,453.3	998.4
15	1 to 14								1,277.8	1,906.5	4,130.5	864.6	173.0	637.2	4,803.7	4,842.7	3,466.7	15,187.1
16	Institutions	Households	Urban															
17				Rural	Target x sub-area	Landowners non-target			209.2	379.8	1,028.4	59.0	592.8	997.1	12,410.2	8,921.2	3,851.0	2,071.0
18						Landless labourers			217.7	459.3	150.7	120.3	31.7	526.3	12,597.8	1,929.4	3,087.7	1,716.9
19						Potatoes	Owners	Up to 4.99 ha	292.8	2,259.1	4,268.2	265.2	24.4	7.2		527.1	1,628.4	414.6
20								5 to 19.99 ha	514.2	714.6	1,612.4	110.0	18.3	5.2		630.8	1,772.2	1,099.9
21							Landless operators		253.0	2,845.2	5,458.9	380.0	0.07	5.7		497.5	339.6	325.1
22						Cotton	Owners	Up to 9.99 ha	283.7	1,337.5	2,742.9	465.1	74.2	309.2	111.4	519.7	4,241.1	499.2
23								10 to 49.99 ha	155.7	132.2	415.6	72.5	28.6	116.3	189.3	621.6	803.3	581.3
24							Landless operators		116.4	1,293.6	2,452.9	507.8	0.3	169.8	346.5	231.0	219.1	170.3
25						Citrus	Owners	Up to 9.99 ha	34.8	1,014.0	6,987.7	21.9	1,750.8	3,000.3	1,144.6	1,803.6	12,641.5	1,281.5
26								10 to 49.99 ha	18.4	206.7	977.9	3.4	607.4	1,121.8	1,684.8	1,291.3	462.8	1,493.7
27							Landless operators		15.3	3,689.8	6,168.9	59.1	11.9	1,669.0	790.6	615.8	768.8	436.8
28		Government																
29		16 to 28							2,111.2	14,331.8	32,260.5	2,064.3	3,140.5	7,927.9	29,275.2	17,589.0	29,815.5	10,090.3
30	Rest of the world								577.0	1,139.7	857.0	747.1	120.9	422.3	5,427.1	2,375.6	977.3	322.6
31	Combined capital account																	
32	Columns totals								3,966.0	17,378.0	37,248.0	3,676.0	3,434.3	8,987.4	39,506.0	24,807.3	34,259.5	25,600.0

Note: some rows and columns do not sum exactly to their corresponding totals because of rounding.

(cont.)

Table 2
The Brejo social accounting matrix for 1975 (thousands of cruzeiros)

Receipts \ Expenditures									11	12	13	14	15	16	17	18	19	20	21
														Institutions					
														Households					
															Rural				
																Target x sub-area			
																	Potatoes		
																	Owners		
									Off-farm processing	Distributive trade	Services	Dummy sector	1 to 14	Urban	Landowners non-target	Landless labourers	Up to 4.99 ha	5 to 19.99 ha	Landless operators
1	Regional activities	Potatoes									67.3		1,079.6	54.3	17.3	6.2	3.4	2.0	5.1
2		Beans							6,885.9				785.4	3,088.7	457.6	2,011.3	1,074.0	699.1	1,487.9
3		Manioc											25,669.3	56.0	7.4	59.8	14.7	17.2	14.1
4		Cotton																	
5		Oranges												117.4	30.2	33.2	11.8	10.7	8.4
6		Bananas												162.7	16.7	43.8	12.3	9.8	14.4
7		Sugar cane							14,919.4				16,363.3						
8		Livestock								4.2	933.2		951.1	8,115.3	1,600.3	2,717.8	845.4	735.8	710.4
9		Other agriculture							1,147.6		166.0	235.3	4,329.9	2,614.5	564.9	1,418.9	618.6	450.5	564.8
10		On-farm processing								196.7			196.7	1,984.2	266.8	1,409.2	757.2	470.8	887.7
11		Off-farm processing									739.8	1,114.4	1,854.2	12,970.9	1,050.1	2,875.9	1,355.5	870.1	1,082.5
12		Distributive trade							1,882.0	697.0	498.1	328.0	6,144.8	4,263.4	540.3	952.8	386.1	307.4	521.3
13		Services							1,029.8	393.3	137.0	256.6	1,816.7	4,099.0	178.8	1,120.4	452.2	266.7	264.2
14		Dummy sector							1,034.5	82.7	207.1		11,054.7	1,799.6	456.1	441.3	233.9	154.8	81.9
15	1 to 14								26,900.1	1,373.9	2,748.5	1,934.3	70,246.6	39,326.0	5,186.5	13,090.6	5,765.1	3,994.9	5,642.7
16	Institutions	Households	Urban						38,418.9	19,483.7	4,794.6	10,996.1	73,693.4						
17				Landowners non-target									30,519.7						1,360.6
18				Landless labourers									20,837.8						
19				Target x sub-area	Potatoes	Owners	Up to 4.99 ha						9,687.0						
20							5 to 19.99 ha						6,477.6				68.3		26.1
21						Landless operators							10,105.1						
22					Cotton	Owners	Up to 9.99 ha						10,584.0						
23							10 to 49.99 ha						3,116.4						
24						Landless operators							5,512.6						
25					Citrus	Owners	Up to 9.99 ha						29,671.1						
26							10 to 49.99 ha						7,868.1						
27						Landless operators							14,226.0						
28		Government												1,514.5	1,325.6	101.8	37.0	82.8	30.9
29	16 to 28								38,418.9	19,483.7	4,794.6	10,996.2		1,514.5	1,325.6	101.8	105.3	82.8	1,417.9
30	Rest of the world								2,785.1	1,387.1	3,581.8	8,793.6	29,514.2	23,439.2	3,071.8	7,610.8	3,893.5	2,479.3	3,235.7
31	Combined capital account													10,037.3	24,509.7	222.9	109.6	114.7	56.9
32	Columns totals								68,104.1	22,244.7	11,124.9	21,724.1		74,317.0	34,093.6	21,026.1	9,873.5	6,671.7	10,352.9

Note: some rows and columns do not sum exactly to their corresponding totals because of rounding.

(cont.)

Table 2
The Brejo social accounting matrix for 1975 (thousands of cruzeiros)

Receipts \ Expenditures									22	23	24	25	26	27	28	29	30	31	32
									Institutions										
									Households										
									Rural										
									Target x sub-area										
									Cotton			Citrus							
									Owners		Landless	Owners		Landless	Govern-ment	16 to 28	Rest of the world	Combined capital account	Row totals
									Up to 9.99 ha	10 to 49.99 ha	operators	Up to 9.99 ha	10 to 49.99 ha	operators					
1	Regional activities	Potatoes							3.2	1.2	2.8	6.2	2.0	7.3		111.0	2,775.4		3,966.0
2		Beans							1,122.9	334.7	820.5	2,741.5	660.0	2,094.2		16,592.2			17,378.0
3		Manioc							27.5	8.5	7.8	85.1	13.4	20.0		331.3	11,247.4		37,248.0
4		Cotton															3,676.0		3,676.0
5		Oranges							17.2	4.0	4.7	45.9	12.7	12.0		308.2	3,126.1		3,434.3
6		Bananas							15.8	5.5	8.0	49.5	12.0	20.5		371.0	8,616.4		8,987.4
7		Sugar cane															23,142.7		39,506.0
8		Livestock							1,183.8	370.9	392.0	3,519.0	947.8	1,007.2		22,145.7	1,311.2	399.3	24,807.3
9		Other agriculture							721.4	235.6	311.6	1,954.6	545.7	802.0		10,803.1	21,339.4	-2,212.9	34,259.5
10		On-farm processing							841.9	204.2	457.2	1,808.5	419.9	1,290.0		10,797.6	14,605.7		25,600.0
11		Off-farm processing							1,401.7	419.1	592.6	4,087.3	1,027.8	1,525.4		29,258.9	35,774.9	1,216.1	68,104.1
12		Distributive trade							482.5	132.9	290.1	1,354.2	402.2	739.4		10,372.6	4,641.2	1,086.1	22,244.7
13		Services							433.9	129.8	143.2	1,284.6	386.7	369.3		9,128.8		179.4	11,124.9
14		Dummy sector							251.3	84.4	44.6	745.5	252.8	119.1		4,665.3		6,004.1	21,724.1
15	1 to 14								6,503.1	1,930.6	3,075.1	17,681.9	4,683.0	8,006.4		114,886.9	130,256.4	6,672.1	322,057.3
16	Institutions	Households	Urban												623.6				74,317.0
17			Rural	Target x sub-area	Landowners non-target						647.4			1,205.3	360.6				34,093.6
18					Landless labourers										188.3				21,026.1
19					Potatoes	Owners	Up to 4.99 ha								186.5				9,873.5
20							5 to 19.99 ha								99.7				6,671.7
21						Landless operators									247.8				10,352.9
22					Cotton	Owners	Up to 9.99 ha								162.2				10,746.2
23							10 to 49.99 ha		18.8		139.4				46.9				3,321.5
24						Landless operators									166.9				5,679.5
25					Citrus	Owners	Up to 9.99 ha								411.6				30,082.7
26							10 to 49.99 ha					33.7		259.2	91.0				8,252.0
27						Landless operators									400.3				14,626.3
28		Government							69.2	85.0	20.8	223.6	210.0	50.0					3,751.2
29	16 to 28								88.0	85.0	807.6	257.3	210.0	1,514.5	2,985.4				158,551.5
30	Rest of the world								4,008.1	1,235.2	1,776.4	11,436.6	3,022.4	5,026.4		70,235.4		4,212.7	103,962.3
31	Combined capital account								147.0	70.7	20.4	706.9	336.6	79.0	765.8		-26,294.1		10,884.8
32	Columns totals								10,746.2	3,321.5	5,679.5	30,082.7	8,252.0	14,626.3	3,751.2		103,962.3	10,884.8	

Note: some rows and columns do not sum exactly to their corresponding totals because of rounding.

Table 3

	$B_{(28 \times 1)}$		$D_{(28 \times 1)}$	Sectors (Cr$1,000)
	2,775.40		3,954.58	(1) Potato
	0.00		16,679.97	(2) Beans
	11,247.40		36,540.58	(3) Manioc
	3,676.00		3,676.00	(4) Cotton
	3,126.10		3,422.07	(5) Oranges
	8.616.00		8,972.16	(6) Bananas
	23,142.70		39,256.10	(7) Sugar cane
	1,710.50		23.888.74	(8) Livestock
	19,126.50		33,717.72	(9) Other agriculture
	14.605.70		24,804.93	(10) On-farm processing
	36,699.10		66,985.99	(11) Off-farm processing
	5,727.30		21,705.26	(12) Distributive trade
	179.40		10,778.92	(13) Services
$Q^{-1}_{(28x28)}{}^{x}$	6,004.10	=	21,334.62	(14) Dummy Sector
	0		96,481.98	(15) Imports
	0		33,074.15	(16) Savings
	0		72,242.65	(17) Income household 1
	0		29,942.35	(18) Income household 2
	0		20,560.77	(19) Income household 3
	0		9,452.51	(20) Income household 4
	0		6,327.81	(21) Income household 5
	0		9,845.61	(22) Income household 6
	0		10,369.54	(23) Income household 7
	0		3,044.05	(24) Income household 8
	0		5,385.58	(25) Income household 9
	0		29,176.38	(26) Income household 10
	0		7,836.71	(27) Income household 11
	0		13,909.99	(28) Income household 12

deliveries to investment activities (1.5) were very small at Cr$ 6.67 or 2.1% of the total. This modest rate, as will be discussed later, is due to the exclusion from our SAM of public investment activities and to the large remittances of private savings flowing out of the Brejo area.

Reading across row and column 3, we see that government receipts were made up exclusively of rates and taxes (3.2) paid by households. Against this income, the government transfered Cr$ 2.98 million to households in the form of pensions and allowances and saved 3.75 - 2.98 = 0.77 million (5.3), which represents the difference between government expenditures and income receipts.

The rest of the world account (row 4) shows that imports represents a significant share of Brejo's gross output (32%) . Commodity imports by production activities (4.1), by households for final consumption (4.2) and by investment activities (4.5) were Cr$ 103.96 million. Since commodity exports (1.4) were Cr$ 130.25 million, there was a surplus in the balance of payments of Cr$ 26.29 million. To balance the rest of the world account (column 4), this surplus is shown as a negative entry in the capital account (5.4), which means that Cr$ 26.9 million of 12% of the regional GDP flowed out of the Brejo area.

Finally, reading across the combined capital account we can see that savings by households (5.2) and the government (5.3) summed to Cr$ 37.17 million. The outlays on this account were Cr$ 6.67 million (1.5) on domestically produced investment goods and Cr$ 4.21 million on imported vehicles, machinery and equipment items (4.5). To balance investments (Cr$ 10.88 million) with savings (Cr$ 37.2 million), we had to subtract Cr$ 26.29 million (5.4), which, as pointed out earlier, means that a large share (72%) of private savings flowed out of the Brejo area.

Having presented this aggregated picture of the Brejo regional economy, we can now move to a more disaggregated analysis.

5.2 Disaggregated accounts

The set of disaggregated accounts (presented in table 2) comprising 14 sectors of production and 12 classes of households permits a more detailed analysis the structure of production and interindustry transactions in the Brejo economy. At the same time, we can also outline the pattern of household expenditure and income distribution. Other economic variables, such as origin and use of savings, pattern of exports investments etc., can also be traced through.

5.2.1 Gross output use

The first 14 rows in table 2 show demand supply balances for the producing sectors. Analysing the interindustry submatrix (*Xij*) of this balance, we can observe that in general the interindustry linkages are quite modest. The exceptions are deliveries of manioc, sugar cane and tropical fruits (included in "other agriculture") to the on-farm and off-farm processing sectors which account for about 57% of all interindustry transactions. Also, it is important to note that outlays on non-competitive intermediate goods imported from the rest of the world were quite substantial, representing about 42% of domestically produced intermediates.

In contrast, the links between production and household demand are quite strong. This is in accordance both with earlier observations of Johnston and Kilby (1975) and the more recent findings of Bell et alii (1982), which indicate that production-consumption linkages in rural areas are more important in the generation of secondary effects than interindustry linkages. For instance, it is observed in submatrix *Cik* (table 2) that of the major food crops, beans is totally consumed (sales of sector 2 to households) and a small part is imported from outside the Brejo area.[8] Manioc is both consumed directly (a small part) and in processed form (sales of sector 3 to sectors 10 and 11, which in turn sell to households). Sugar cane, on the other hand, is consumed only after processing. As shown in rows 10 and columns 16-27, food processing (mainly manioc flour and derivates) represents a substantial part (35%) of the value of final demand for domestically produced goods. Most of the livestock sector's products are consumed in the area and a small part exported.

A large share of regional gross output (40%) is exported, which indicates that the Brejo economy is highly open to trade. Column 30 shows Brejo's export pattern, in which processing of sugar cane, manioc flour and tropical fruits figures prominently. Manioc root and sugar cane, which are both processed and consumed locally, are also exported to be processed outside the Brejo area. Although some bananas, oranges and potatoes are consumed locally, the larger part (90%) of the total production is marketed in neighbouring areas of Brejo (oranges) and throughout Northeast Brazil (bananas, mainly). Cotton is sold to two ginning factories close to the Brejo area and/or taken by middlemen to processing plants in Campina Grande, the 2nd largest town in the State of Paraíba.

[8] In fact, the region exports some varieties of beans (which are of poor quality) to the interior parts of the Northeast, but also imports varieties of higher quality from the south of Brazil. Since import/export flows have been obtained as residuals, these transactions cannot be captured in the SAM.

5.2.2 Sources of value added, household income and outlays

Columns 1-14 give a breakdown of sectoral costs, which comprise payments accruing to households as suppliers of factor services (rows 16-27) and imports of intermediate inputs (row 30). Observing the figures placed in the above columns and rows, it can be noted firstly that payments to households for factor services are the most significant items of the Brejo's sectoral cost structures; and, secondly, that agricultural activities (columns 1-9) account for over 60 % of regional value added. Note also that manioc, sugar cane and other agriculture are the major contributors to this total at 23.3, 21.1 and 21.5%, respectively.

In table 4, a summarized picture of income and outlays by household class (based on table 2) is presented. As indicated earlier, Brejo's per capita GDP was US$ 147, which is below the level chosen as defining "relative poverty" for Brazil in 1975 (US$ 387). However, table 5 shows that this average income masks some important differences. For instance, it can be observed that the regional distribution of income is highly skewed in favour of large landowners or non-target groups who enjoyed a per capita income of over US$ 1.300 in 1975. In contrast, the incomes accruing to all the other household groups hardly exceeded US$ 200 a year. The most precarious condition is that of those landless operators who received an average income very near the "absolute poverty" line defined as a per capita of less than US$ 50 a year.

The outgoings against this income are found by tracing down columns 16-27 in table 2. These are: payments of taxes to the government (row 28), transfers to other households (see submatrix *Hkk*), expenditure on domestically produced goods (row 1 to 14) and imports (row 30); the rest of the remaining income is saved. With regard to the expenditure pattern of households, the proportion denoted to non-food expenditure increases with income. For instance, it increases from about 22% for landless operators to over 30 and 40% for small landowners and urban households, respectively. On the other hand, there is no clear tendency for import content of consumption to increase with income. This can be explained by the large proportion of food items such as rice, beans, pork meat, fish and tobacco, among others, which are imported by the low-income groups. Expenditure on durables such as domestic equipment, footwear, ready dressmaking, etc., which have high-income elasticities of demand, generally represent a small share of total imports, but their proportion increases with income.

As could be expected, the average rate of savings increased with disposable income. These rates were quite insignificant for landless operators (0.005, 0.003 and 0.005% in potato, cotton and citrus sub-areas, respectively), landless labourers (1.06%) and small-scale farmers (1.11, 1.38 and 2.37%, respectively). For those target farmers in the bigger strata, these rates were still very modest (1.74, 2.18 and 4.18%, respectively). However, for

Table 4 — Incomes and outlays by class of household, Brejo area, 1975

Item \ Class of household	Urban	Rural										
		Landowners Non-Target	Landless Labourers	Target & Sub-area								
				Potatoes			Cottonn			Citrus		
				Owners		Landless Operators	Owners		Landless Operators	Owners		Landless Operators
				Up to 4.99 ha	55 to 19.99 ha		Up to 9.99 ha	5 to 49.99 ha		Up to 9.99 ha	10 to 49.99 ha	
1. Income per household US$*	918.2	7,941.5	649.9	624.3	788.9	492.8	781.5	835.2	401.4	862.0	1,070.2	430.7
2. Income per capita US$*	183.6	1,332.6	129.9	104.0	131.5	82.1	130.2	139.2	66.9	143.7	178.4	71.8
3. Use of disposable income:	100	100	100	100	100	100	100	100	100	100	100	100
a) consumption of domestically produced goods(%)	53.87	15.72	62.63	59.31	60.71	68.74	61.17	60.63	68.62	59.39	58.24	65.52
b) consumption of imported goods(%)	32.19	9.31	36.31	39.58	37.56	31.25	37.45	37.19	31.38	38.24	37.58	34.47
c) savings rate out of disposable income	13.78	74.80	1.06	1.11	1.74	0.005	1.38	2.18	0.003	2.37	4.18	0.005
4. Type of consumption expenditure	100	100	100	100	100	100	100	100	100	100	100	100
a) food expenditure (%)	58.59	61.66	68.65	69.41	68.54	77.81	68.97	67.68	77.78	66.79	61.64	77.68
b) non-food expenditure (%)	41.41	38.34	31.34	30.59	31.46	22.19	31.03	32.31	22.22	33.21	38.36	-22.32
Number of households	9,990	530	3,995	1,952	1,044	2,593	1,698	491	1,747	4,308	952	4,190
Average family size	5	6	5	6	6	6	6	6	6	6	6	6

* This income includes value added received from production activities plus net receipts from other households (i.e., transfers).

those large landowners who represent 2.7% of the total number of producers and own 56% of the Brejo agricultural land, this rate reached 54.8%. The relevant share for urban households was also quite significant (13.78%).

From the above savings figures, it is obvious that the existing outflow of private capital from the Brejo region comes from local landowners and urban households who are responsible for the larger proportion of the total regional savings (66 and 27%, respectively).

Finally, it is important to remark that there are many other interesting aspects of policy implications in the detail provided by the SAM and its subsidiary tables which are not explored here. Furthermore, it is believed that the important insights into the Brejo economy already provided by the SAM are more than enough testimony of its methodological strength as a classificatory data system and analytical tool.

6. A model of the Brejo economy

As stated earlier, the SAM data system provides the necessary statistical base for estimating a wide variety of economic models. In this section it is shown how, based on the estimated Brejo-SAM, a simple linear model of the regional economy can be generated and used to simulate the effects of alternative policy scenarios.

6.1 Specification of the model

Using the row accounts of the full sam presented in table 2, the following accounting identities can be stated:

i) Production accounts

$$X_i = \sum_{j=14}^{14} a_{ij} X_j + \sum_{k=1}^{12} C_{ik} + I_{i} + E_i \qquad (1)$$

(gross output) = (intermediate demand) + (household demand) + investiment demands) + (exp. dem.)

ii) Institutional accounts

$$Y_k = \sum_{j=1}^{14} V_{kj} + G_k \qquad (2)$$

(household income) = (value added receipts) + (government transfers)

$$G = \sum_{k=1}^{12} T_k \qquad (3)$$

(government receipts) = (total taxes paid by households)

iii) Capital account

$$S = \sum_{k=1}^{12} S_k + G_s \qquad (4)$$

(total savings) = (household savings) + (government savings)

iv) Rest of the world

$$M = \sum_{k=1}^{14} M_j + \sum_{j=1}^{12} M_k \qquad (5)$$

(total imports) = (imports by sectors) + (imports by households)

As set out above, the Brejo-SAM encompasses 30 identities and 652 variables. Since we want to simulate the effects of different policies upon the variables portrayed in the identities, we have to make some assumptions about how certain variables are determined in the Brejo economy. By incorporating these assumptions, we transform the Brejo-SAM from a set of accounting identities into an economic model. Using this model, we can predict variable values for years (and/or situations) other than the one on which the SAM is based.

The main assumption in this model is that all the structural relations (technological and behavioural) are linear. Algebraically the specific assumptions can be expressed as follows:

$$a_{ij} = X_{ij}/X_j \qquad i = 1, 2 \ldots\ldots 14 \qquad (a.1)$$

$$a_{mj} = M_j/X_j \qquad j = 1, 2 \ldots\ldots 14 \qquad (a.2)$$

where: a_{ij} and a_{mj} are, respectively, the value of domestic and imported intermediate goods required for the production of one unit of gross output in sector j.

$$w_{kj} = \frac{V_{kj}}{X_j} \qquad \begin{matrix} k = 1, 2 \ldots\ldots 12 \\ j = 1, 2 \ldots\ldots 14 \end{matrix} \tag{a.3}$$

where: w_{kj} is the share of gross output from sector j received by households of type k.

$$c_{ik} = \frac{c_{ik}}{Y_k} \qquad \begin{matrix} i = 1, 2 \ldots\ldots 14 \\ j = 1, 2 \ldots\ldots 12 \end{matrix} \tag{a.4}$$

$$c_{mk} = \frac{M_k}{Y_k} \tag{a.5}$$

where: c_{ik} and c_{mk} are the corresponding expenditure shares for domestic and imported goods, respectively. In other words, consumption of domestic and imported goods is a constant proportion of each group's income.

$$c_s = \frac{S_k}{Y_k} \qquad k = 1, 2 \ldots\ldots 12 \tag{a.6}$$

where: c_s represents the savings function of the Brejo's households, where the savings is a constant proportion of total income (pretax), therefore,

$$\sum_{i=1}^{14} c_{ik} + c_{mk} + c_{sk} = 1 \qquad k = 1, 2 \ldots\ldots 12$$

Substituting (a.1) to (a.6) into identities (1) to (5), we generate the following equations:[9]

$$X_i = \sum_{j=1}^{14} a_{ij} X_j + \sum_{k=1}^{12} c_{ik} Y_k + I_i + E_i \tag{b.1}$$

$$Y_k = \sum_{j=1}^{14} w_{kj} X_j \tag{b.2}$$

[9] In this model we have ignored interhousehold transfers (which cancel each other out) and government savings (*Gs*) and transferences to households (Gk) which are negligibles and unimportantn for modelling purposes.

$$S = \sum_{k=1}^{12} c_s \; Y_k \tag{b.3}$$

$$M = \sum_{j=1}^{14} a_{mj} \; X_j + \sum_{k=1}^{12} c_{mk} \; Y_k \tag{b.4}$$

The meaning of the notation used in equations (b.1) to (b.4) is the same as that presented in table 1.

In matrix form, the above model specialises to:

$$X = AX + Cc\,Y + F \tag{c.1}$$

$$Y = WX \tag{c.2}$$

$$S = Cs\;Y \tag{c.3}$$

$$M = A\,m\;X\,m + C\,Y \tag{c.4}$$

where: X is vèctor of gross outputs with dimensions 14 x 1, A is the square matrix of input coefficients of size 14 x 14, C is a rectangular matrix of size 14 x 12 of domestic consumption coefficients, Y is a vector of household class income with dimension 12 x 1, F is a vector of final demand (which includes inventory accumulation I, and exports E, of output from sector i) with dimension 14 x 1, S is a scalar of total savings, C is a row vector of households savings of size 1 x 12, W is a rectangular matrix of size 12 x 14 of value added shares, C is a row vector of private consumption of imported goods $c\,mk$ with dimensions 1 x 12, M is total imports, and Am is a row vector of size 1 x 14 of import coefficients (Cmj).

Since we are particularly interested in measuring the multiplier effects arising from production-demand linkages, we want output and household income to be determined endogenously. In other words, we close the SAM model by transferring the household transactions from the final demand portion of the SAM table to the endogenous portion (which in the standard input-output analysis is the interindustry matrix).

With this objective in mind, equations (c.1) to (c.4) can be partioned as follows:

$$\left(\begin{array}{c|c|c} I-A & 0 & -Cc \\ \hline -Am & & -Cm \\ & I & \\ 0 & & -CS \\ \hline -W & 0 & I \end{array}\right) * \begin{pmatrix} X \\ M \\ \\ \\ S \\ Y \end{pmatrix} \quad \begin{pmatrix} F \\ I+E \\ 0 \\ \\ 0 \\ 0 \end{pmatrix} \qquad \text{(d.1)}$$

Q D B

The model (d.1) can be written:

$$Q \,.\, D = B \qquad \text{(d.2)}$$

where: Q is a square 28 x 28 matrix of structural coefficients, D is a 28 x 1 column vector of the endogenous variables and B is 54 x 1 column vector of the endogenous variables.

Provinding that the matrix Q has an inverse, the solution to the system is:

$$D = Q^{-1} \,.\, B \qquad \text{(d.3)}$$

Given the simplicity of the model, all the parameters can ben obtained directly from the SAM. It can be noted that the main diagonal elements of Q are positive and the remaining non-zero elements are negative and smaller than one. Give these features, we can assume that matrix Q has an inverse. Table 3 shows the inverse matrix (Q^1) of the Brejo model, in which household incomes and savings as well as imports are endogenous.

To check whether our Q^1 matrix is correct and our system internally consistent, we multiply the inverse matrix (Q^1) by the final demand vector (B), whose values are fixed at their values in table 2.

The results shown below indicate that the values of the corresponding sectors in vector D are almost exactly the same as those found in table 2, column/row 32. The small differences between the two sets of values is due to rounding off (in the calculation of the matrix of coefficients) and the exclusion of interhousehold and government transfers from the model.

6.2 Multiplier analysis having the Brejo-SAM as base

Before using the Brejo model for simulation purposes, it is important to discuss briefly how an inverse matrix (such as Q^1) can be extremely useful for multiplier analysis. This, in turn, is a necessary step towards understanding how

secondary effects (SEs) arising from production-demand linkages (in which we are particularly interested) can be measured.

Basically, multiplier analysis is concerned with measuring the total impact upon income, employment and output resulting from changes in levels of sectoral expenditure. In order to measure these changes, a set of multipliers can be derived from the SAM-based models. In contrast to the aggregate Keynesian multiplier, the set of multipliers derived from SAM (or input-output) models are disaggregated, recognising that the total impact on income, output and employment will vary according to which sector experiences the initial expenditure change (Richardson, 1972; Miernyk, 1965).

Manipulation of the SAM to adjust the degree of closedness, i.e., the allocation of final demand components into the intersectoral or interindustry matrix, permits us to obtain different types of multipliers. One of the most commonly used multipliers for measuring the degree of structural interdependence between each sector of production and the rest of the economy is the output (or column) multiplier. This multiplier measures the total direct and indirect requirements from all production sectors which are necessary to deliver one additional unit (in monetary terms) of output *i* to final demand. In the Brejo case this multiplier could have been obtained by firstly estimating the Leontief inverse of the Brejo model (*I-A*), and secondly by summing the entries in the column under the sector of activity *i*. Since evidence has shown that interindustry linkages in rural areas are rather weak, and consumption-production linkages quite significant, this is not a particularly useful indicator.

With regard to measuring the effects of increased income in target areas on production, the income multiplier (labelled type II) is particularly useful.[10] This multiplier takes into account the direct, indirect plus the induced changes in income resulting from increased income spending, i.e., it measures the repercussionary effects of secondary rounds of income expenditure. This measure is given by the ratio of the direct, indirect and induced income change to the direct income change due to a unit increase of final demand. In order to derive this multiplier, we should therefore endogenise the household sector and then calculate the inverse of this expanded matrix. The household row in this inverted matrix indicates the direct, indirect and

[10] In the standard input-output literature, two types of income multipliers are reported, type I and II. Income multiplier type I, which is expressed as the ratio of the direct plus the indirect income changes resulting from a unit increase in final demand for any given sector, is obtained by multiplying each column entry in the Leontief inverse matrix (households excluded) by the supplying industries corresponding household row coefficient from the direct coefficients table, and summing the row multiplications (Richardson, 1972, p. 32).

induced coefficients for each sector. The direct income change coefficients come directly from the household row of the direct coefficients table.

To obtain these income multipliers from the Brejo model, we would need, firstly, to close the basic transactions table (matrix *A*) with respect to households (matrices *W* and *C)*. and secondly to estimate the inverse of this new matrix, i.e.:

$$\begin{pmatrix} I-A & C_c \\ -W & I \end{pmatrix}^{-1} \qquad \text{(e.1)}$$

In order to illustrate the derivation of direct, indirect and induced coefficients of income change and of income multipliers type II from the Brejo model, we will assume that (e.1) is equivalent to Q-1 which is not true since Q-1 includes import and savings coefficients as well). For example, summing up the coefficients provided in table 2 (row 17 to 28, columns 1 and 7, respectively), we have computed the direct, indirect and induced income change per unit of final demand for activities "potatoes" and "sugar cane". The ratio of these coefficients (1.44878 and 1.3696, respectively) to direct income changes coefficients (0.5320 and 0.7409) leads to income multipliers (type II) of 2.723 and 1.848 for the potatoes and sugar cane sectors, respectively. It is interesting to note that the direct income change, due to an increase in final demand for these sectors is larger for the sugar cane sector (74% of increase in income per unit of output value); and on the contrary, indirect and induced income changes are larger in the Potato sector. The explanation for this difference is that most of the income generated by the sugar cane sector (excepting salaries paid to landless labourers) goes to large landowners who do notre-spend this income in the regional economy. This result is consistent with the large outflow of private savings (mainly of large landowners) from the Brejo economy. Thus, the magnitude of the income multipliers are very important in identifying which are the sectors (and/or groups) generating the most significant indirect changes in income resulting from output changes.[11]

Despite the brevity of the above discussion, it becomes clear that the SAM framework is particularly appropriate to multiplier analysis of the effects of exogenous injections into a target area economy (for example, increased export demand and/or investment) on incomes, output emplay-

[11] Unless otherwise noted, the use of the term "indirect" in this work is equivalent to that of "indirect plus induced".

ment. According to the classification system embodied in the SAM, multipliers also can be computed by class of household and used, for example, to assess the distributional impact on income of increased sectoral output in target areas.

Many other categories of multipliers and multiplier decomposition can be explored using the SAM framework as a base. It is beyond the scope of this paper to explore these aspects; however, a detailed discussion of these is found in Pyatt and Associates (1977), Bulmer-Thomas (1978) and Defourny and Thorbecke (1984).

6.3 Simulation exercises using the Brejo model

The simplicity of the Brejo model entails some limitations that should be mentioned. The most important are the assumptions of fixed coefficients of the sectoral production functions, unitary elasticities of demand, constant returns to scale and perfectly elastic supplies of all input and resources.

Being aware of the above limitations, we use the Brejo model to examine simultaneously the effects on the Brejo economy of two situations: the large increase in hectarage devoted to sugar cane that occurred in the regional economy from 1975 to 1980, and the changes in potato-production technology as envisaged by the Brejo project.

According to official figures (FIBGE, 1979*a*, 1982), the area dedicated to sugar cane increased by 86%, that is, from 12,961 ha. to 24,107 in the period 1975-80. Certainly, this expansion had nothing to do with the Brejo project, but related to the national Alcohol Programme (Proálcool).

Since we do not have at hand either a subsidiary model to simulate area substitution changes of the Brejo farming sector or data about crop area changes that have occured in the period, we have therefore assumed that part of the land cultivable but not in use has been substituted by sugar cane. In fact, the increase in sugar cane hectarage during this period represents only 62% of the total cultivable land not in use in 1975. Although some small increases in yield rates have occurred, we have considered that the increase in the gross output value of this sector is exclusively due to the incorporation of areas not in use. Accordingly, the new gross output figure of this sector is Cr$ 73,479,700. After deducting for intersectoral requirements (value of cuttings required for the sector itself and deliveries to the off-farm processing sector), the net output increase (Cr$ 53,387,270) is placed in the final demand vector B, i.e., for exporting. Accordingly, the Brejo model solves for all gross outputs (X), household incomes, savings (S) and imports (M), given the new level of exports of the sugar cane sector. And conseqüently produces a SAM depicting the new equilibrium of economy consistent with this predetermined value.

However, as stated earlier, we want also to simulate the effects of the new potato-production technology recommended by the project. Before the project, farmers grew traditional varieties of potato with practically no use of agrochemicals and without soil conservation practices. According to the Brejo appraisal report (IBRD, 1978), the cropping of potatoes would be the most valuable agricultural activity in terms of the value of the incremental production due to the project. Yields were expected to increase from 3.2 to 12.5 t/ha. This large increase would be obtained by improving seed quality and by changes in agricultural practices, especially in the use of fertilizers and the methods of land preparation.

In order to incorporate technical change, we replace the column 1 of matrix A (in 1975), which represents the traditional technology, by the column 1', which represents the new combination of inputs recommended by the project.

The new vector of input and value-added coefficients — shown in table 5 — replaced the corresponding one in matrix Q. As in the case of the sugar cane sector, the increase in potato gross output value was delivered to export demand. So, the modified Brejo model incorporating the above changes becomes:

$$Q' \times D' = B' \qquad \text{(f.1)}$$

where: Q' is 28 x 28 matrix of structural coefficients in which the new elements of the potato sector (input and value-added coefficients) have been inserted, D' is a 28 x 1 column vector of the endogenous variables, and B' is the 28 x 1 column vector which incorporates the new values for export demand of sector 1 and 7.

Then the new equilibrium for the regional economy is given by inverting matrix Q' and post multiplying the result by the vector B', i.e.:

$$D' = Q' \times B' \qquad \text{(f.2)}$$

The comparison between the variable values in the original SAM and those obtained by incorporating the above changes allows us to assess the magnitude of the effects on the regional economy. Tables 6 and 7 display values of sectoral output and household incomes corresponding to the steady state of the Brejo economy in 1975 and in the simulated situation, say 1980.

Table 6 shows that the regional gross output rose by 37.47% from Cr$ 316 million to Cr$ 434 million over the period. Undoubtedly, the largest relative and absolute increases corresponded to the potato and sugar cane sectors, respectively. Since interindustry linkages were rather feeble in the

Table 5

The new set of input values and the vector of coefficients of the recommended technology for the potatoes sector

Sector *(ij)*	Set of input values Cr$ x 1,000[1]	Vector of input coefficients[2]
(1.1) Potatoes	5,877.03	0.16220
(12.1) Distributive trade	536.91	0.0148
(14.1) Dummy sector	1,274.21	0.0351
(15.1) Imports	2,567.13	0.0708
(17.1) Household type 1[3]	0.000	0.000
(18.1) Household type 2	5,801.68	0.1599
(19.1) Household type 3	1,428.43	0.0394
(20.1) Household type 4	2,663.28	0.0734
(21.1) Household type 5	6,518.47	0.1797
(22.1) Household type 6	2,066.51	0.0569
(23.1) Household type 7	3,036.47	0.0837
(24.1) Household type 8	2,692.88	0.0742
(25.1) Household type 9	1,045.59	0.0288
(26.1) Household type 10	345.24	0.0095
(27.1) Household type 11	305.78	0.0084
(28.1) Household type 12	118.39	0.0033

[1] The set of input values *(Xij, Mj)* has been calculated using the imput coefficients provided by the Brejo appraisal report (IBRD, 1978, annex 4, table 5). Imports now include urea, T-superphosphate, potassium chloride, fungicide, and adhesives which are not produced in the Brejo area.

[2] This vector of coefficients (calculated as follows: $aij = Xij/Xj, .a_m = MjXj$, $wkj = V_kj/Xj$) has been inserted in the new matrix of coefficients Q'. The remainder of the 28 coefficients in this column are all zero.

[3] Value added figures were estimated using the same procedures reported in table 1.

Brejo economy, the expansion in the other sectors was mainly due to consumption-production linkages.[12] There were broad gains in the beans, livestock, services, distributive trade, and dummy sectors. The value of regional imports increased by 36.8 millions (38.2%) between 1975 and 1980. In other words, output increases in the potato and sugar cane sector brought about, through expanded household incomes, substantial gains elsewhere in the Brejo economy, including outside the project area.

[12] Note that the cotton sector, which is neither processed nor consumed in the Brejo area, remained at the same level as in 1975.

Table 6

Changes in sectoral gross output due to the simulated situations

Sectors	Cr$ x 1,000		% of change (*B*) - (*A*)/(*A*) x 100
	Situation "before" the changes (*A*)	Situation "after" the changes (*B*)	
Potatoes	3,954.58	35,155.78	788.99
Beans	16,679.97	23,097.76	27.78
Manioc	36,540.58	41,060.81	12.37
Cotton	3,676.00	3,676.00	0.00
Oranges	3,422.07	3,531.81	3.20
Bananas	8,972.16	9,095.07	1.37
Sugar cane	39,256.10	72,942.90	85.81
Livestock	23,888.74	31,999,37	33.95
Other agriculture	33,717.72	38,552.95	14.34
On-farm processing	24,804.93	28,757.72	15.93
Off-farm processing	66,985.99	77,069,48	15.05
Distributive trade	21,705.26	27,161.71	25.14
Services	10,778.92	14,148.87	31.26
Dummy sector	21,334.62	27,768.38	30.16
Imports	96,481.98	133,320.05	38.18
Gross output value*	315,717.64	434,018.61	37.47

* Excluding imports.

As shown in table 7, household incomes grew by 38.61% in the aggregate due to the simulated changes. The largest relative increase occurred in the potato sub-area, where most of this crop (63.9%) is grown. Although the largest area devoted to sugar cane is in the citrus sub-area (89%), it should be noted that the income increase, in relative terms, is smaller than in the other two sub-areas. This is due to the fact that non-target landowners — who crop 87% of the above area — are classified in a separate category. Also, the figures in this table suggest that, in general, the distribution of income between urban and rural households improved, and that obviously those producers who grew potatoes and sugar cane did particularly well.

As discussed earlier, there is clear evidence that a significant number of people are unemployed or underemployed in the Brejo farming sector. Therefore, if we assume a perfectly elastic supply of labour, the increase in income paid (mainly by the sugar cane sector, which has high labour requirements) to landless labourers can be interpreted as an expansion in the number of permanent workers now employed in this sector. In other words, if we apply the average annual wage of a permanent worker to the new income figure, we find that about 3,068 new jobs have been generated directly and indirectly due to the changes introduced.[13]

[13] The number of permanent workers was 4,696 in 1975. Hence, the average annual wage for temporary workers was US$ 540.8 in 1975. Applying this average to the corresponding income figures "after" the changes, the new number of permanent labourers can be worked out.

Table 7

Changes in household incomes due to the simulated situations

Household classes	Situation "before" the changes			Simulated situation "after" the changes			% of change
	Total income US$ x 1,000	US$		Total income US$ x 1,000	US$		
		Income per household	Income per capita		Income per household	Income per capita	
(1) Urban	8,918.84	892.78	178.55	10,792.46	1,080.33	216.06	21.00
(2) Landowners non-target	3,696.59	6,974.70	1,162.45	6,174.50	11,650.00	1,941.67	67.03
(3) Landless labourers	2,538.37	635.39	127.07	4,197.42	1,050.67	210.13	65.36
Potato sub-area	(3,163.7)			(4,980.77)			(57.43)
(4) Owners up to 4.99 ha	1,166.98	597.83	99.64	1,673.99	857.58	142.93	43.45
(5) Owners 5 to 20 ha	781.21	748.57	124.76	1,631.91	1,563.13	260.52	108.89
(6) Landless operators	1,215.51	468.76	78.13	1,674.87	645.92	107.65	37.79
Cotton sub-area:	(12,320.90)			(3,513.23)			(51.37)
(7) Owners up to 9.99 ha	1,280.19	753.94	125.66	1,827.36	1,076.18	179.36	42.74
(8) Owners 10 to 50 ha	375.81	765.40	127.57	761.38	1,550.67	258.44	102.59
(9) Landless operators	664.89	380.59	63.43	924.49	529.19	88.20	39.01
Citrus sub-area:	(6,286.79)			(7,664.24)			(21.91)
(10) Owners up to 9.99 ha	3,602.02	836.12	139.35	4,239.47	984.09	164.01	17.70
(11) Owners 10 to 50 ha	967.49	1,016.27	169.38	1,301.42	1,367.04	227.83	34.51
(12) Landless operators	1,717.28	409.85	68.31	2,123.35	506.77	84.46	23.65
Totals	26,925.18	803.98	144.02	37,322.62	1,114.44	199.63	38.62

It should be noted that by multiplying the vector C' by the matrix of direct coefficients $(Q' + I)$ a complete SAM for 1980 could have been generated consistent with the exogenous values given and the structural changes incorporated in matrix Q'. Also we could have solved the model by incorporating separately the above mentioned situations which had allowed us to disentangle the project-induced effects from those due to the Proálcool programme.

However, in the real world, evaluation of an RDP is not so easy, as the illustrative exercises discussed above imply. In addition to the expected (in an *ex-ante* evaluation) or implemented actions (in an *ex-post* evaluation), there are various other autonomous changes in population, consumption patterns, private investment, relative prices and government expenditure, which can affect the output of many sectors in the regional economy and therefore household incomes, demand and employment, among other economic variables.

Providing the data are available, all these changes could be disentagled using more appropriate (and complex) models. As mentioned earlier, in each case the model could provide steady state or equilibrium pictures of the economy considering both the conditions defined by the exogenous variables and the behavioural and technological assumptions adopted.

7. Conclusions

From the construction of the Brejo-SAM and its use as an analytical tool for project evaluation, the following conclusions have emerged:

1. The issues that can be addressed with a SAM are strongly determined by the system of classification and the extent of disaggregation adopted. For evaluation purposes, a SAM should include both the particular area conditions and the specific project objectives to which the evaluation process is directed. This requires a comprehensive disaggregation of those socio-economic groups and production activities which are the specific project targets, as well as the inclusion (in a more aggregated form) of those institutions which play a relevant role in a target economy by interacting with the target group.
2. Having pre-established an adequate SAM classificatory scheme, most of the economic transactions among and within different institutions and production activities in a project area can be ordered and accounted for in a consistent and systematic way by providing a picture of the economic structure of a target area which is essential as a policy diagnosis foundation to assess, modify or establish rural development strategies.
3. The statistical information contained in a SAM provides the necessary base for estimating a certain range of economic models which are powerful analytical tools for simulating different policy scenarios and/or disentangling pro-

ject-induced effects from autonomous change. In addition, the SAM has proved to be an appropriate base for multiplier analysis of the effects of exogenous factors and sectoral expenditure upon income, employment and output, among other economic variables. These allow us to have a clear idea about the magnitude and direction of the downstream or secondary effects (SEs) induced by a project. This, as demonstrated in our case study, has important implications for regional planning, since most of the literature on the appraisal of RDPs has more often been concerned with the discussion of SEs in a qualitative way than quantifying them. This neglect has led not just to significant discrepancies between the targets and purposes aimed at, but in some cases has aggravated the situations which were intended to be solved.

4. The feasibility of this approach for project evaluation — which is very demanding in data collection, processing and analytical capability — was deemed to be possible if embodied within a regional or central system of evaluation and applied to a few well-selected projects which are representative of a wider group, novel in design and particularly important in economic, political or strategic terms. Since this approach focuses on the effects of a large project on output and incomes in a target project area it is an important complement to social cost-benefit analysis, which measures the project impact on the national economy.

Resumo

O objetivo deste artigo é contribuir para a avaliação de projetos de desenvolvimento rural (PDRs) idealizando uma Matriz de Contabilidade Social (MCS) na qual as principais metas desses projetos, como crescimento auto-sustentado, aumento de oportunidades de emprego, distribuição eqüitativa de renda e os efeitos secundários que afetam estas variáveis, possam ser mais bem compreendidas e mensuradas. Para esse propósito, são estabelecidos os princípios, métodos e requerimento de dados envolvidos na construção de uma adequada MCS para avaliação de PDRs. A validade desse enfoque como um sistema de classificação de dados e como um instrumento analítico é, então, empiricamente testada para um estudo de caso no Nordeste brasileiro. A aplicação mostra que a maioria das transações econômicas dentro de e entre diferentes grupos socioeconômicos, bem como as atividades produtivas na área alvo do projeto, pode ser ordenada e levada em consideração de uma maneira consistente e sistemática. Desse modo, o enfoque baseado na MCS fornece uma representação da estrutura econômica da área alvo que é essencial para um diagnóstico de política que avalie, modifique ou estabeleça estratégias de desenvolvimento rural. Além disso, a informação estatística contida na MCS proporciona base necessária para a estimação de uma gama de modelos

econômicos, que são poderosas ferramentas analíticas para simulação de distintos cenários de política e/ou para distinguir efeitos induzidos pelo projeto de modificações autônomas.

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