AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20523

BIBLIOGRAPHIC INPUT SHEET

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1. SUBJECT CLASSIFICATION
   A. PRIMARY: SOCIAL SCIENCE
   B. SECONDARY: DEVELOPMENT PLANNING

2. TITLE AND SUBTITLE

A PRE-FEASIBILITY REPORT ON AGRICULTURAL SECTOR ANALYSIS IN GUYANA

3. AUTHOR(S)

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4. DOCUMENT DATE	5. NUMBER OF PAGES	6. ARC NUMBER
OCTOBER 1972	17 PAGES	ARC GY-630.9881-H784

7. REFERENCE ORGANIZATION NAME AND ADDRESS

UNIVERSITY OF FLORIDA
FOOD AND RESOURCE ECONOMICS DEPT.
GAINESVILLE, FLORIDA 32611

8. SUPPLEMENTARY NOTES *(Sponsoring Organization, Publishers, Availability)*

9. ABSTRACT

This paper has discussed sector analysis as a tool for generating coordinated projects and policies designed to achieve the highest feasible growth rates. A rather general discussion of Guyana's agriculture revealed that four major subsectors could comprise the sector model. The comments on data availability indicated that the complexity of programming requirements for each subsector are likely to be inversely proportional to data availability.

There are multiple goals in development planning. Guyana would probably wish to achieve some satisfactory rate of increase in per capita GDP. Simultaneously, foreign exchange earnings and expenditures-balance of payments-is a prime consideration, especially for a small, fragile economy. In an undeveloped economy, there is very little room for experimentation on the actual economy by inexperienced policy makers and project proponents-a dearth of "risk capital" exists. It is the author's conclusion that sector analysis affords an approach to the development problem that minimizes risk while still allowing action. The rigors of a successful sector analysis should provide indigenous policy makers with valuable experience concerning their own situation as well as provide an invaluable tool with which to develop coordinated projects and consistent policy sets.

10. CONTROL NUMBER	11. PRICE OF DOCUMENT
PN-AAB-060	
12. DESCRIPTORS	13. PROJECT NUMBER
COORDINATED PROJECTS AND POLICIES, FOREIGN EXCHANGE, GROWTH RATES, SECTOR MODEL, ECONOMY, DEVELOPMENT PLANNING, PER CAPITA GDP	931-11-130-144
	14. CONTRACT NUMBER: AID/CSD-3684
	15. TYPE OF DOCUMENT: RESEARCH STUDY

AID 590-1 (4-74)

Box 5

A PRE-FEASIBILITY REPORT ON AGRICULTURAL SECTOR ANALYSIS IN GUYANA

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October, 1972

A PRE-FEASIBILITY REPORT ON AGRICULTURAL SECTOR ANALYSIS IN GUYANA

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A PRE-FEASIBILITY REPORT ON AGRICULTURAL SECTOR ANALYSIS IN GUYANA

I. INTRODUCTION

"Sector Analysis"[1] is as much (perhaps more) a way of approaching problems as it is the application of specific techniques. Applied properly to a well-defined sector, this approach can yield valuable information on the operational characteristics of the components of the sector as well as the interrelationships between the sector components. This information can be used to identify priority project areas and to ensure that a consistent policy set is maintained within the sector and between the subject sector and other sectors of the economy. A haphazard analysis of a poorly defined sector can produce a morass of inconsequential numbers at an inordinate cost. In any case, sector analysis is expensive. However, costs must be weighed against the usefulness of anticipated information and the importance of the sector to the economy in deciding whether or not to undertake a given sector analysis.

I must confess to some biases at this point. I am a devout believer in the usefulness of sector analysis as a planning tool. However, I have had some experience with sector analysis in a simulation framework and am

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[1] "Sector Analysis" refers to analysis of a relatively "closed" system - systems analysis. Use of "sector" rather than "system" is an attempt by economists to dissociate themselves from engineers and/or to distinguish unto themselves a, basically, engineering technique. The socio-economic systems to be analysed need not be completely closed. However, numerous interfaces with other systems may indicate that the system is insufficiently closed to permit meaningful analysis and requires redefinition. "Simulation", refers to the generation of pseudo-observations on the system by a dyanmic model of the system, generally employing a fairly large (e.g. IBM's SYS 360/ MOD 65) digital computer.

aware of the exhaustive data requirements of the technique as well as the demands made on the conceptual abilities of the primary researchers.[2] With regard to United States Agency for International Development (USAID) use of sector analysis as a planning tool for work in undeveloped countries, a few observations are in order. USAID is not a part of the State Department by accident. The goal of fostering development is at least partly selfish, designed to win "grass-roots" friends among the often hostile and politically unstable set of what is euphemistically referred to as "Less Developed Countries". From this point of view, the absence of development projects is preferable to the execution of unsuccessful projects. Development projects may be unsuccessful for a number of reasons: the projects may be ill-conceived or badly managed; or they may be successful in themselves but have no effect on the economy because they are counteracted by a lack of development at another level in the system or by a government policy set that severely limits their effectiveness. It is very difficult for individuals, working in a loosely coordinated manner, to identify high priority projects once the few obvious projects are completed, much less foresee all the possible "bottlenecks" that may subvert a given project. A well executed sector analysis (of, say, the agricultural sector) can be an invaluable aid in assisting a Mission in preparing an effective program that will satisfy the twin goals of fostering development and winning

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2 In talking to people who are "sold" on the benefits of sector analysis, but who have never been involved in one, I get the feeling that this "awareness" is not universal.

"grass-roots" friends for the United States. It can also be so expensive in relation to potential benefits that the Mission may want to consider terminating its continued involvement in the sector rather than undertake the sector analysis.

II. THE ROLE OF SECTOR ANALYSIS IN DEVELOPMENT

A. Identifying Interrelations in the Sector

A "sector" is usually defined as one of the industrial classes in standard Gross National Product (GNP) accounts. For example, the agricultural sector may be defined as the set of activities relating to the output of agricultural products. The definition of subsectors is not so straightforward. The agricultural sector can be viewed as being composed of a number of vertical commodity subsectors. For example, the livestock or rice subsectors are the sets of activities related to the output of livestock products or rice and include the factor supply, production, processing and marketing, and consumer demand activities. Alternatively, a sector can be conceived of as the four "horizontal" subsectors of factor supply, production, processing and marketing, and consumer demand, each subsector cutting across all commodity lines. Arguments can be made for each division. The commodity-subsector, or "vertical" subsector, approach is employed here. This approach facilitates the in-depth study of a particular industry, such as livestock, as a system and is consistent with the commodity oriented approach of many USAID projects.

Once the form of the sector model has been settled upon, the researcher can begin to fit the model together. This process can yield valuable information by making explicit the interrelationships between subsectors and between segments of a given subsector. As an example, in Guyana, rice and sugar are grown on similar soils and both are net earners of foreign exchange. Assume that neither crop involves subsidies. A price subsidy policy for rice to promote increased production may result in increased production through more intensive cultivation of existing rice acreages, the employment of previously uncultivated land, or the transfer of sugar land into rice production. It is conceivable that the entire increase in rice production could come from sugar lands being diverted to rice production. The effect on the combined value of production and net export earnings of the two crops is unclear. The increase in value of rice production less the cost of the subsidy may not offset the decreased value of sugar production. Net export earnings may be affected similarly. A sector analysis of the agricultural sector should be able to provide information as to the likely effect of the price subsidy, thus averting possible undesirable consequences resulting from an incomplete understanding of all the interrelationships involved.

An example of valuable information resulting from specification of the interrelations within a subsector can be taken from the livestock subsector. Imagine a project designed to increase the output of the beef industry by increasing productivity at the primary production level. Such a project,

while successful in itself, may have little effect on the supply of beef at the consumer level if the processing and marketing facilities are not simultaneously upgraded. A government policy designed to stimulate beef production by eliminating imported beef products from the market may also prove self-defeating. The increased demand for local beef animals competes severely with the increased demand for breeding animals needed to build up local beef herds and may result in depletion of the breeding herd through sale and non-replacement of cull cows. A well-executed sector analysis can point out inconsistencies in policy sets and project designs before they are implemented.

B. Developing a Consistent Project and Policy Set

As can be seen by the examples in the previous section, sector analysis can be useful in avoiding undesirable policy sets and/or projects. In addition, a computerized model of a sector can be employed to generate consistent policy sets and to identify integrated projects with high pay-off potential. Once the model is formalized and the critical indicators of sector performance chosen, proposed policy sets and/or projects can be incorporated into the model. Computer runs with the revised model will give an indication as to the effect of these policies on the performance indicators. In this way, policy sets and projects may be at least partially evaluated before they are implemented at much less cost than experimentation on the real sector.

III. GUYANA'S AGRICULTURAL SECTOR: DESCRIPTION AND PROGRAMMING REQUIREMENTS

In 1971, the farming sector (excluding fishing, forestry and manufacturing related to agriculture) accounted for 17.8% of Guyana's G$500.6 million Gross Domestic Product (GDP). Of this 17.8%, sugar accounted for 10.5%, rice for 2.3%, other crops for 2.8% and livestock for 2.1% (breakdown totals to 17.7% due to rounding). Manufacturing related to sugar, rice, other food and tobacco accounted for 8.1% of GDP. Over the period 1967-71, the farming sector grew at the average rate of 7.1% with wide annual fluctuations (-0.6% in 1970 to 13.6% in 1969) and no discernible trend. The mining and quarrying sector, accounting for 18.0% of GDP in 1971, grew at an average annual rate of 8.9% with a marked downward trend (from 19.4% in 1968 to 0.2% in 1971). (Source: Table 5, p. 7 of IMF Restructed Document SM/72/90; Guyana - Recent Economic Developments).

A. Sugar

The bulk of the sugarcane production is concentrated on the estates of two British companies although an increasing share of the production is attributable to small independent farmers (8.5% of total production in 1970-71). Sugarcane production per acre is significantly higher in Guyana than in other Commonwealth Caribbean countries. The value of output per man in sugarcane production is estimated to be about twice as high as for all other agricultural activities in Guyana. However,

agricultural activities in Guyana are relatively inefficient. Productivity per worker is about one half of the national average perhaps as low as one-third the national average if sugarcane is excluded.

In any analysis of Guyana's agricultural sector, sugar must be included. Sugarcane is the most important crop in Guyana's agriculture and has the largest impact on value of agricultural production and foreign exchange earnings. However, it is relatively efficient and an unlikely candidate for development projects. Programming for sugar may well reflect a gross input-output approach designed to reflect the effect of policy sets on the industry. The portion of a sector model relating to sugar should be able to predict the effect on land, labor and capital employed in sugarcane production and the flows of these factors of production between sugarcane and other crops in response to profit differentials between the various crops. The model will not need to predict the effect of introduction of new cane varieties or improved cultivation procedures since these are unlikely events. Later generations of the model may need to be modified to evaluate the effect of mechanised harvesting but this task should be fairly simple, involving changes in the land-capital/labor ratios and production per acre.

B. Rice

Rice production is carried out by small, independent, relatively inefficient farmers. Low capital investment and poor drainage and irrigation contributing to flooding and drought (which renders uneconomic

the adoption of improved seeds, fertilizers, etc.) contribute to this inefficiency. Government launched a five-year rice rehabilitation program in 1969 designed to create a rice experiment station, provide extension services to improve growing techniques, and improve storage, handling and processing facilities. Currently, the storage and handling facilities are under construction and/or nearing completion. The rice experiment station has not been started and extension services have not been personally assessed.

Rice production has potential for improvement although the Government seems to feel that it has everything under control. Due to the low probability of USAID instituting further development programs in rice, it is probably not desirable to model the rice subsector in much greater detail than the sugar subsector. However, since rice production has a high employment potential, it is desirable to model the subsector in sufficient detail to predict the effects on land-capital/labor ratios of projects and policies designed to improve subsector performance.

C. Livestock

The Ministry of Agriculture and National Development in its Annual Report estimates meat production in 1971 at 21,666,200 pounds. Table 1 presents the breakdown by animal class of this total. For an estimated 1971 population of 740,000, meat production averaged 29.3 pounds per capita. Due to religious influences, per capita meat consumption was probably distributed bimodally around this average production (and increased by net imports). The figures in Table 1 for sheep and goats, especially the

estimated slaughtering, are of a dubious nature. If, in fact, extraction rates for sheep and goats are as low as implied by Table 1, there is room for tremendous improvement. It is more likely that most sheep and goats are slaughtered at home and thus do not enter the official statistics. The extent to which home slaughter has biased the cattle, pigs and poultry figures is unclear.

The poultry industry in Guyana seems to be relatively efficient although the reliance on imported chicks and eggs for hatching is fairly heavy. The swine industry seems to do fairly well although marked improvements in carcass quality (less fat - more lean) can be made. The cattle industry is characterized by low birth rates, low survival rates and the resulting low extraction rates. Cattle are raised on an extensive basis and modern herd management practices are virtually non-existent. Coastal pastures are subject to bi-annual flooding while interior pastures have low inherent fertility and are subject to intermittent floods and/or droughts, depending on location. The Livestock Development Project, currently under way, is attempting to improve the beef cattle industry by establishing 27 ranches. The University of Florida is engaged in research on forages and herd management at the Ebini Research Station and information is available on alternative production systems (see: Hooker, "The Economic Potential for Beef Cattle, Grain and Legume - Seed Production in the Intermediate Savannahs of Guyana"). Guyana's dairy industry is largely an unknown quantity.

TABLE 1 - BASIC DATA ON GUYANA LIVESTOCK - 1971

Animal Class	Population No.	Slaughtering No.	Meat Production Lbs.	Average Slaughter Weight Lbs.
	----------1,000----------			
Cattle	254.0	32.8	9,524.5	291
Pigs	80.0	28.2	3,321.2	118
Sheep	90.0	4.3	98.3	23
Goats	30.0	0.6	12.9	22
Poultry	8,000.0	2,903.1	8.709.3	3

	Implied Extraction Rates (%)
Cattle	12.9
Pigs	35.3
Sheep	4.8
Goats	2.0
Poultry	36.3

Milk Production	3,575,000 Gallons

The livestock subsector should receive considerable programming attention. The sector model should be able to identify productive projects and policy sets (as well as counterproductive ones). Potential bottlenecks to proposed projects should be identified and eliminated. For example, the current Livestock Development Project concentrates on ranch establishment. However, it is not manifestly clear that current processing and marketing facilities are adequate to handle the proposed 48% increase in production, much less exploit the improved quality animals to the fullest extent. The livestock subsector must be modelled in sufficient detail to identify these and similar problems.

D. Other Crops

Information about "other crops" is, at best, spotty. The University of Florida's research on soybeans and peanuts has resulted in the release of two plant varieties (Jupiter soybean and Altika peanut) adapted to Guyana and production information on corn and field peas (Vigna peas - cow peas). (See Hooker, "Economic Potential ...."). There is, at present, little or no "commercial" production of these crops beyond small, hand-cultivated plot production. The Government operates a venture at Kibilibiri, concentrating on these crops, that has met with less than unqualified success. There are coconut plantations in the country which yield a declining production. The causes of declining copra and coconut oil production include praedial larceny (common thievery) from the plantations, increasing use of green nuts for beverage consumption and

the government practice of subsidising competitive oil imports. The Government has been and is experimenting with oil palm and at least one private firm is establishing a plantation. No oil palm plantations are currently in production. Israel has sent a fruit crops expert to Guyana to assist in developing citrus, mango, avocado, etc. production. The University of Florida is currently conducting a vegetable crops research program. The researcher-in-residence, Dr. G. K. Saxena, has completed one season of work. These results and the results of the approaching season should yield valuable information on the production of tomatoes, cabbages, carrots and onions.

The "other crops" subsector seems to hold the most promise for affording projects with high payoff. This subsector will probably require the most detailed programming of the subsectors listed here. The model should be capable of assessing shifts in land, labor and capital between crops as well as the effect on the agricultural sector as a whole in response to projects and policy sets implemented in this sector.

IV. DATA AVAILABILITY

The amount of data available to support empirical work in the subsectors is, roughly, inversely proportional to the programming detail required in the subsectors. Extensive data on the sugar subsector certainly exists. To obtain it will require winning the confidence and cooperation of the large sugar producers. Less extensive data seems to exist for the rice subsector. However, the existing data can be easily

supplemented by interviews with rice farmers, private and government processors and government marketing bodies. The livestock subsector has been extensively studied at the production level (see the International Development Association's "Beef Cattle Project: Guyana" loan document; Hooker, "The Economic Potential ...." and the list of references thereto). Not much is known about the market processes operating between the production, processing and marketing and consumer demand segments of the subsector. I, personally, am unfamiliar with studies on livestock other than beef. Production information on corn, soybeans, peanuts and pigmented Vigna peas is available (see Hooker, "The Economic Potential ...."). By March, 1973, Dr. Saxena will have completed two seasons work on selected vegetables. Little is known about the oil tree crops other than coconut, or fruit crop production. For all livestock and "other crops", knowledge of the processing and marketing activities is minimal.

While the picture for data availability is not bright, it is not hopeless. Model specification will clearly indicate data needs. After as many needs as possible are filled from existing data, it will be a straightforward matter to collect the remaining required information.

V. SUMMARY AND CONCLUSIONS

Table 2 shows the percentage contribution to the 1971 GDP of the major sectors of the Guyanese economy and the average sectoral growth rates for the period 1967-71. For the period 1968-70, the average annual population

TABLE 2 - SECTORAL CONTRIBUTION TO 1971 GDP AND AVERAGE ANNUAL SECTORAL GROWTH RATES, 1967-71

Sector	1971 GDP (Percent of Total)	1967-71 Growth Rate (Percent per Annum)
Total	100.0	7.6
Farming	17.8	7.1
Sugar	(10.5)	(11.1)
Rice	(2.3)	(-4.9)
Other Crops	(2.8)	(7.4)
Livestock	(2.1)	(7.6)
Fishing	2.0	2.8
Forestry	1.5	2.0
Mining and Quarrying	18.0	8.9
Manufacturing	12.2	7.6
Sugar	(3.7)	(9.8)
Rice	(0.5)	(-12.8)
Other Food and Tobacco	(3.9)	(7.7)
Other Manufacturing	(2.3)	(6.8)
Electricity	(1.8)	(15.6)
Engineering and Construction	8.9	15.1
Distribution	11.3	6.1
Transportation and Communications	5.7	3.8
Rent of Dwellings	2.2	4.7
Financial Services	3.2	7.9
Other Services	3.7	3.9
Government	13.5	9.1

Source: IMF Restricted Document SM/72/90 cited in text.

increase was 2.1% (net of an approximately 1% net emigration rate). During the late 1960's, per capita GDP was increasing at about 5% per year.

Say that a 20% increase in per capita per annum GDP is desired. This means a 22% increase if population increases at a 2% per annum rate. Based on its 1971 contribution to GDP and the 1967-71 annual percentage rates of increase, agriculture (defined as farming and manufacturing related to farming) contributes about 1.9% to annual growth in GDP and by subtraction, the other sectors about 5.7%. If the other sectors continue to grow at the combined rate of 5.7% per annum, then agriculture must contribute 16.3% to growth in GDP. This implies a rate of increase in agriculture (initially 25.9% of GDP, i.e. Farming plus the manufacturing categories of Sugar, Rice and Other Foods and Tobacco) of 62.9% per annum. If sugar continues to grow at its present rate and rice remains static (zero growth), then "other crops" and livestock must achieve a growth rate of 168% per year. That is, a part of agriculture contributing 8.8% of GDP in 1971 is expected to provide an annual growth in GDP of 14.8%. Whether this may or may not be an unreasonable goal, even for a few years, is debatable. In any case, careful planning will be required.

This paper has discussed sector analysis as a tool for generating coordinated projects and policies designed to achieve the highest feasible growth rates. A rather general discussion of Guyana's agriculture revealed that four major subsectors could comprise the sector model. The comments

on data availability indicated that the complexity of programming requirements for each subsector are likely to be inversely proportional to data availability.

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