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Reference Center  
Room 1636 HS

PROJECT REVIEW

Agv Diversification and Trade  
in  
Latin America

North Carolina State University  
Contract AID/csd-3632

by

Douglas D. Caton, TAB/AGR/AID  
John G. Stovall, CED/ERS/USDA

Agricultural Diversification and Trade  
in  
Latin America

Dr. Richard L. Simmons  
Project Leader

I. Introduction

A field review of end of project status of the NCSU project on agricultural diversification and trade was held at Raleigh, April 12 and 13, 1976. Participants in the review were Douglas Caton, AID/TAB, John Stovall, ERS/USDA, and R.L. Simmons, Project Leader. The review focused on the prospective content of the final report under the contract (general contract provision 16). Provision 16 asks for a report which finalizes the research by summarizing the accomplishments of the assignment, methods of work used, and recommendations regarding unfinished work and/or program continuation. The NCSU contract officially ended March 31, 1976.

II. Project History

The NCSU research on diversification and trade in Latin America was completed in two phases. Phase I, contract AID/csd-3283, was a feasibility study for a specific research project. The NCSU Phase I study in Latin America was coordinated with USDA and East-West Center Phase I studies on diversification and trade in the Far East. This Phase covered the period May 1, 1971 to April, 1972, with a funding level of \$50,000. Phase II of the research, Contract AID/csd-3632, covering the period, April, 1972 to March 31, 1975 (extended to 3/31/76), evaluated the comparative advantage of selected Central American countries to export winter vegetables to the U.S. and Canada. The estimated total expenditure on Phase II, 1972-1976, was \$284,397.

The project originated with discussions between the Regional Bureau Agricultural Officers and Dr. Art Coutu, TAB/AGR, centering on concern that very little was known about price, and about markets. Don Feister, LA/DR, pin-pointed vegetables and the small farm labor surplus in Central America as the theme of the project. The project contract was written to require active host country cooperation and participation in the research, and an objective was included on seminars, workshops and training.

In accomplishing this objective, efforts were to be directed to:

(1) Evaluating the export potential of Guatemala and El Salvador to U.S. and Canadian markets.

(2) Analyzing alternative means and costs of transporting and distributing vegetables from the production zones to the market.

(3) Holding workshops in Central America to secure adequate coordination of the research.

Fulfillment of these objectives involved the following steps:

(1) estimation of the demand for selected winter vegetables in U.S. and Canadian markets;

(2) estimation of the supply potential for winter vegetables on small, medium, and large farms in the primary production areas of Guatemala and El Salvador, compared with competing areas of Florida and Mexico;

(3) evaluation of domestic demand and consumption compared with export demand;

(4) analysis of alternative means and costs of transporting and distributing vegetables from production zones;

(5) summarization of all analytical data developed in (1) through (4) above by using appropriate analytical procedures and models;

(6) the holding of an annual workshop in Central America to ensure adequate coordination of the research.

More was done on some project objectives than on others. A few objectives required by-passing for reasons of lack of data, absence of local support, and changes in local conditions and interests. For example, the investigators discovered early in the project that the analysis would have to include Mexico since that country was the major competitor for the U.S. Market.

Together, the objective covered the following lines of research: (1) macro-level investigations requiring estimates of supply and demand functions--in Central America, and in the U.S. and Canada, assessed according to relative price, future demand, and farm costs, and (2) a two-fold country-level assessment: (a) conditions under which winter vegetables might be economically exported by El Salvador and Guatemala, and (b) conditions for successful participation of small farmers.

Project publications and manuscripts are listed in Appendix 1. A budget accounting as of March 16, 1976 is attached as Appendix 2. A list of LDC nationals trained at NCSU is attached as Appendix 3. An outline of the report being prepared by Dr. Simmons as the concluding project report is attached as Appendix 4. The final report is scheduled to be completed on/about May 31, 1976. (Note: The outline, as written, appears to be a report on the final phase of the project, rather than a final report on the entire project as outlined in Article 16).

### III. Project Review

A. The review of the research, the findings and recommendations included an evaluation of the following aspects of the projects:

1. An explanation of the technical composition of the NCSU demand estimation, together with a statement of the kinds of questions it can handle.

2. Judgements as to what could be done with the data assembled, or the kinds of data generated by the model.

3. What was the understanding of the purpose of the research: (a) Was it the question of comparative advantage of crops vs the U.S. and Mexico, and (b) was it to help build up country analytical bases?

4. What has been the experience of the project in assembling and analyzing data, holding workshops, dealing with the small farmer participation question, and developing its inter-regional trade model?

5. What are the expectations regarding what the findings of the project may be able to add to the ability of a country to plan development?

6. To what extent has the project--through workshops, graduate training, meetings of various kinds--been able to add to building country planning competence?

B. The review brought out the following facts and conclusions:

1. Food production oriented research and technical assistance must be coupled with an economic evaluation of demand (both foreign and domestic) in order to assess economic development alternatives.

2. The major analytical tool used in the project was a quadratic programming model. The model is a slightly different version of one developed by Duloy, Norton, and Hazell, of the World Bank Team.

The model contains vegetable production activities for Guatemala and Mexico and demand functions for Mexico and the United States.

3. Considerable effort was devoted to the estimation of demand for the winter vegetables under consideration. Statistical demand models were developed for selected vegetables by months in the U.S. Demand was also estimated for Mexico and certain other competing areas.

4. A somewhat novel approach involved use of "risk aversion" coefficients in the objective function. The risk aversion coefficients in effect "penalizes" the more risky enterprises by adding to their cost of production an amount to compensate for risk. Arbitrary levels of the risk aversion coefficients were selected and the sensitivity of the solution was evaluated.

5. The model appears to be useful for addressing questions of the type specified in the objectives of the project. It can evaluate the export potentials for countries not presently influential in the market under consideration. It is also useful to evaluate changes in various factors such as tariffs, quotas, wage rates and yield levels.

6. The model appears to be technically valid. Evidence of this include reviews by ERS researchers and acceptance of papers describing the model by professional journals. The methodology has been disseminated rather widely in the economics profession.

7. The quality of data used in the model was difficult for the reviewers to assess. It appears that the project participants used the best available data but most of this was not documented in such a way that its quality could be evaluated. The quality of data appeared to be relatively good in Mexico but poor in Guatemala and El Salvador.

C. The Project Leader's observations and conclusions on the findings of the research included:

1. He was unable to achieve objectives three and four (see II, above), and therefore, concentrated on objective five, the use of models to evaluate the demand for exports. Workshops and seminars were held in Central America to the extent feasible and appropriate (objective six).

2. Vegetable supply potentials for Guatemala and Mexico were estimated (a sub-project with the University of Florida team in El Salvador did not yield adequate supply estimate results).

3. Domestic demand for fresh vegetables is not large enough yet, to be a factor requiring statistical estimates. Preservation and storage of vegetables could add an important dimension to the total vegetable picture, but only after domestic per capita income and employment increases substantially. At the present time mainly traditional food habits affects what is consumed.

4. Alternative means of transporting of commodities to export markets, and the costs-returns of quality control should be evaluated. Export market potential estimates must incorporate the cost and volume effects of tariffs and quotas.

5. Export marketing, particularly for vegetables, is high risk, high management demand, compared to the domestic situation. The cost of export marketing at present rates is ten times the cost of production and the exporter bears the entire cost of price decline, spoilage and loss, waiting time, and market close-outs. Quality control is much more essential than for domestic markets.

6. Any expansion of export trade in the foreseeable future depends upon getting yields up 50 percent or more, reducing production costs by half, introducing quality control, finding volume markets, and being able to develop integrated large scale operations. The small farmer doesn't appear in this picture except insofar as he may chose to rent his land, or furnish labor.

7. Two workshops were held, one in Guatemala, and one in El Salvador. A third workshop was to have been held (in Guatemala) but outbreak of Mediterranean Fruit Fly removed all local support and interest. Problems encountered included financial support of potential participants, limited AID Mission and AID/Washington support, and the fact that export vegetables were relatively unimportant.

#### IV. Conclusions and Recommendations

##### A. Conclusions

1. Knowledge of markets, prices, trade and terms of trade, is a requirement of comparative advantage studies of economic alternatives.

2. However, Phase I could probably have better established how vegetable production really was, the direction in which it was tending; then, it could have better judged what needed to be found out, and how to do it.

3. The project as contracted contained objectives for which data could not reasonably be obtained, and country participation requirements which could not be achieved.

4. The small farmer participation requirement, except as a labor input, possibility could have reasonably been ruled out on other grounds prior to the initiation of the contract.

5. The demand estimation model will require explanation and clarification to be directly useful to LDC planners. Part of the clarification will require country data on specific cases, and training seminars or workshops.

#### B. Recommendations

1. Distribute the technical appendix explaining the demand estimation model to planning staffs in Central and South America, soliciting their response to the usefulness of the model as an analytical tool, and their interest in a workshop on this model, and in modeling in general.

2. Prepare a digest of the project materials, and from other sources on demand and price estimating which could add to a country's planning ability.

## Appendix 1

### Publications and Manuscripts under AID/csd-3632

- (1) Roberto Castro, "Expected Effects of Changing United States Tariff Levels on Winter Green Peppers", Ph.D. Thesis, NCSU, 1973.
- (2) Hans Binswanger, "The Measurement of Biased Efficiency Gains in U.S. and Japanese Agriculture to Test the Induced Innovation Hypothesis", Ph. D. Thesis, NCSU, 1973.
- (3) Roberto Castro and H.A. Seagraves, "The Supply of Winter Green Peppers in Florida", Economics Research Report No. , Department of Economics, NCSU, 1974.
- (4) Roberto Castro and R.L. Simmons, "The Demand for Green Peppers, Cucumbers, and Cantaloupes in the Winter Seasons, Economics Research Report No. 27, Department of Economics, NCSU, April 1974.
- (5) Carlos Baanante, "Andean Group Economic Integration: The Case of the Nitrogenous Fertilizer Industry", Ph.D. Thesis, NCSU, 1974.
- (6) Hans Binswanger, "Problems with the Identification of Optimal Agricultural Export Diversification in Less Developed Countries in the Presence of Trade Distortions", discussion paper, mimeo, 42 pp. NCSU.
- (7) David J. Zimst, The Economic Potential for Increasing Vegetable Production in the Zapotitan District, El Salvador, M.S. thesis, University of Florida, 1974.
- (8) Richard L. Simmons and Carlos Pomareda, "Equilibrium Quantity and Timing of Mexican Vegetable Exports", August 1975.
- (9) Carlos Baanante and Richard L. Simmons, "Effects of a Customs Union on the Nitrogenous Fertilizer Industry of the Andean Zone," a paper submitted to Journal of Common Market Studies, accepted for publication, also published in El Trimestre Economics, January-March 1976.

Appendix 1 (Continued)

- (10) Carlos Pomaneda and R. Simmons, "A Risk Programming Model for Planning Mexican Vegetables Exports", a chapter in Bassoco, L.M. et. al., Programming Studies for Agricultural Sector Policy, a book to be published by John Hopkins President.
- (11) Carlos Pomaneda and R. Simmons, "Planning Risky Supply of Fresh Vegetables to U.S. Winter Models", a paper submitted to Operational Research Quaterly, London.

12/1/75 - 2/23/76  
Reporting Period

of Corporation of St. Gray University at Saleish  
Responsible Officer: Dr. Richard L. Simmons

Contract No. AID/CSD 3632  
Phone No. 737-2239

	4/1/75-3/31/76 Total Budget Amount (1)	Total Expenditures		Estimated Expenditures	Completion
		To Date 4/1/75-2/23/76 (2)	This Period 12/1/75-2/23/76 (3)	2/1/75-3/31/76 (4)	2/31/76 (5)
	\$ 145,200.00	\$ 147,574.39	\$ 5,314.19	\$ 700.00	\$ 144,474.39
Salaries & Wages	100,000.00	98,000.00	84.00	100.00	98,084.00
Travel	2,000.00	4,400.00			4,400.00
Supplies	1,000.00				
Printing	1,000.00				
Telephone	1,000.00				
Postage	1,000.00				
Contractual	1,000.00	17,140.00			17,140.00
Equipment	1,000.00	1,434.39			1,434.39
Other	1,200.00	304.00		100.00	1,204.00
Subtotal	1,275.00	1,547.39	12.4	100.00	1,572.89
Interest	1,000.00	1,807.29	311.17	100.00	1,807.29
Other	1,000.00				
Subtotal	1,000.00	28,075.00			28,075.00
Grand Total	\$ 145,200.00	\$ 205,071.39	\$ 5,322.31	\$ 1,200.00	\$ 204,396.50

I hereby certify that the amount invoiced herein do not exceed the contract price.

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Contract and Grant Officer DATE 3/15/76

BEST AVAILABLE DOCUMENT

Appendix 3

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Training of LDC Nationals

- R. Castro, Ph.D., Fen, May 1974
- C. Baanate, Ph.D., Pen, May 1974
- A. Baanate, one semester only, (No degree)
- E. Ospine, M.S., Colombia, September 1974
- C. Pomerade, Ph.D. studies (No degree)
- H. Binswanger, Ph.D., Switzerland, August 1972
- J. Hernandez, Ph.D., Guatemala-Mexico-still here
- R. Rodriguez, Ph.D., Mexico, no thesis yet
- S. Mastashari, Ph.D., no thesis yet
- L. Zavaletz, M.S., Peru, May 1975
- C. Barandianari, Undergraduate, Peru, no degree yet

Appendix 4

OUTLINE FOR FINAL REPORT

SUMMARY

INTRODUCTION

Competition for U.S. Market  
Characteristics of U.S. Market

OBJECTIVES

General Objectives  
Specific Objectives

definition of problem

Mexican production  
Florida production  
Guatemalan production  
El Salvadorean production  
Small farmer participation  
Possibilities for Alternative Markets  
Domestic Market  
Processed Products

MODEL SPECIFICATION

Interdependence of production areas  
Riskiness

THE TECHNOLOGY SET FOR GUATEMALA

The Producing Activities  
Land Use Calendars  
Water Requirements  
Input Requirements  
Yields  
Input Prices  
Product Prices  
Resource Constraints

ANALYSIS OF EXPORT POSSIBILITIES

The Actual Situation  
Decrease in U.S. Production  
Increase in U.S. Demand  
Increase of Yields in Guatemala  
Increase in Rural Wages in Mexico  
Elimination of U.S. Tariffs on Vegetable Imports  
Increasing Yields of Cucumbers

CONCLUDING REMARKS

2  
Appendix 4 (Continued)

REFERENCES

- APPENDIX A - The Mathematical Model  
Appendix B - The Production Budgets for Guatemala

90%

50%