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FINAL TECHNICAL REPORT

AID 211(d) GRANT/csd 2824

to

IOWA STATE UNIVERSITY

DEPARTMENT OF ECONOMICS

1970 - 1976

TO STRENGTHEN COMPETENCE IN THE
ECONOMICS OF AGRICULTURAL
DEVELOPMENT FOR THE
LESS DEVELOPED COUNTRIES

February 25, 1977

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I. 211(d) FINAL TECHNICAL REPORT - GRANT AID/csd - 2824

GRANT TITLE: TO STRENGTHEN THE UNIVERSITY'S COMPETENCE
IN THE ECONOMICS OF AGRICULTURAL DEVELOPMENT
FOR THE LESS DEVELOPED COUNTRIES

211(d) Final Technical Report

Date Due: March 30, 1977

Date: February 25, 1977

GRANTEE: Iowa State University
Department of Economics

COORDINATOR: Randall A. Hoffmann
211(d) Committee

AID SPONSORING TECHNICAL OFFICE: Technical Assistance Bureau

AID PROJECT MONITOR: Al Harding

STATISTICAL SUMMARY:

Period of Grant: July 1, 1970 to September 30, 1976 as
extended by Amendment No. 3 executed
June 27, 1975.

Amount of Grant: \$375,000 Basic Grant, June 24, 1970
\$495,000 Amendment No. 3, June 27, 1975
\$470,000 Amendment No. 4, February 4, 1976

Cumulative Expenditures:

July 1, 1970 - June 30, 1975: \$338,954.41

Expenditures for Final Reporting Period;

July 1, 1975 - September 30, 1976: \$131,045.59

Total Expenditures;

July 1, 1970 - September 30, 1976: \$470,000.00

ACKNOWLEDGMENTS 1/

Appreciation is expressed to the Agency for International Development and the Iowa State University 211(d) Committee for providing an opportunity to travel to Ghana and to complete the Master's degree program. By travelling to Ghana I was able to obtain a more worldly view of life. It was the most significant educational experience I have ever encountered.

Acknowledgment of appreciation from a recent 211(d) participant.

NARRATIVE SUMMARY

The 211(d) Grant to Iowa State University terminated on September 30, 1976. This final technical report summarizes activities and accomplishments throughout the project, but considerable attention is also focused on the final grant period in accordance with instructions received from the AID Project Monitor. More detailed descriptions of activities and accomplishments from prior periods are found in previous reports submitted to the Agency for International Development.

Major accomplishments during the final grant period reflect the achievements of prior years of "strengthening within the University, competence in the economics of agricultural development for less developed countries, including staff support services for solution to the problem." Staff support services have been strengthened by direct involvement of senior staff members in the economic development problems of the less developed countries. Linkages with cooperating entities of other nations have been established and priority research problems have been identified. Numerous development research projects have been completed and others are near completion. Many additional economic development problems warrant further research. However, in accordance with the Grant Officer's letter of June 27, 1975, which extended the funding and timing of the Grant through September 30, 1976, major emphasis of the program during the final grant period focused on completion of studies underway and the utilization of research

results through, and in cooperation with, linkages established with cooperating entities in the developing nations.

Several major research projects were completed on priority agricultural development problems during the last period. Completed research projects were concerned with the following agricultural development problems: (1) optimal resource allocation and farm plan adjustments for small farms in Ethiopian agriculture; (2) adoption of technologies appropriate for rural development in Peru; (3) evaluation of water resource drainage and irrigation projects in Guyana; (4) distribution of fiscal incidence by income groups and economic sectors in Sri Lanka; (5) economic analysis of development of the wheat subsector of Jordan; (6) estimation of the demand for meat in Iran; (7) analysis of agricultural credit system in Ghana. Research projects nearing completion include: (1) alternative agricultural sector policies for the Peruvian agricultural planning process; (2) rural community development and growth centers in Thailand; (3) optimum resource allocation for the agricultural sector of Peru; and (4) factors affecting farmers adoption of agricultural technologies in Iran. The research projects encompass studies in eight different countries from Latin America, Africa, Southeast Asia and the Near East. They are indicative of the wide range of linkages which have been developed by the Department of Economics with support of the 211(d) institutional grant. In each instance research projects were carried out with cooperating entities of the host countries. Graduate researchers travelled to the individual countries to collect field data and

results of the studies have been, and will be, made available to the cooperating institutions.

Twelve senior staff members provided direct support and supervision of research projects during the final reporting period. Staff travel and direct interaction with cooperating entities was severely restricted during the last three quarters of the period due to budget limitations associated with a downward adjustment in the total amount of grant funds available to the University (Amendment No. 4, February 4, 1976).

Numerous accomplishments have been achieved since initiation of the 211(d) Grant in 1970. Several of the more significant accomplishments which are a result of, or directly related to, the 211(d) project are summarized as follows:

- (1) Major staff involvement,
 - 50 percent of staff with overseas experience in 40 developing countries
 - 12 man/years of on-campus professional services provided in direct support of project
 - 10 man/years of long-term professional talent sharing services provided to AID/W and overseas USAID Missions
 - 30 man/months of short-term professional services provided to less developed countries;
- (2) Significant graduate student participation,
 - 35 graduate student researchers participated in project
 - graduate students were attracted from 33 different countries
 - 75 percent of total grant expenditures was expended for graduate researchers' salaries and benefits, international travel, fees and other related research activities

--participation in the development project was evaluated as, "the most significant educational experience....ever encountered";

(3) Important research contributions

--45 development research dissertations and papers completed during past six years with 6 more nearing completion

--56 texts, articles and other manuscripts published on development subjects

--9 occasional papers printed in support of 211(d) objectives;

(4) Development course work expanded and strengthened,

--18 courses currently offered on economic development and related topics

--courses instructed by senior professionals with considerable overseas development experience;

(5) Research linkage established and strengthened,

--research linkages established with more than 25 cooperating entities of less developed countries

--linkages also strengthened with other 211(d) research and educational institutions.

Additional activities and accomplishments are described in following sections of this report.

II. GENERAL BACKGROUND AND DESCRIPTION

Iowa State University is one of the oldest land grant universities in the United States and is recognized as one of the leading institutions involved in teaching, research, and extension activities in the fields of agricultural economics and economic development. These activities are administered in the Department of Economics. The Department of Economics at Iowa State University is jointly administered by the College of Agriculture and the College of Sciences and Humanities.

The joint structure of agricultural economics and general economics within a single department welds the two science areas together through a series of cooperative interrelationships in teaching and research activities. This joint approach emphasizes the linkages between agriculture and other sectors of the economy in both industrialized and less developed countries. The Department of Economics has traditionally maintained close research and training ties with the Departments of Animal Science, Agronomy, Statistics, Computer Science and Mathematics. The end product of the interdisciplinary linkages is found in the large number of joint research projects conducted by specialists from two or more of the different departments, the numerous joint graduate training programs, and the healthy interchange of professional dialogue among members of the several departments.

The Department of Economics has demonstrated its strong interest in economic development and international programs through supporting both on-campus research and training programs and off-campus technical assistance projects. Nearly 50 percent of the Department's staff of 54 professionals has participated in economic development research and training activities in more than 40 countries of the world. The overall quality and international experience of the Department's staff has attracted graduate students from 33 different countries. During the past six years the number of foreign students in the graduate training program comprised 39 percent of the average total enrollment of 176 graduate students.

Results of the Department's international outreach program are found in more than 45 graduate dissertations completed on economic development problems since December of 1971 as well as numerous professional articles, papers, texts and other publications completed by staff members on international development topics during the past six years.

Personnel at Iowa State University have a long and wide experience in developing, applying, and using the general family of research techniques and planning methods which simultaneously incorporate farm, regional and national relationships for comparing agricultural sector options in policy and development. These methods have been applied in over three dozen analyses. Applications have grown along with the experience and data accumulated for these purposes. Department of Economics staff is highly experienced in data generation and synthesis, adaptation of models to specific policy analysis and evaluations, computer programming, and interpretation and

presentation of results for decision makers and policy administrators. Skills in these areas have evolved from the Department's traditional strength in statistical and quantitative analysis.

The University's capacity in the field of agricultural development is enhanced by the quality and breadth of several centers and institutes. The Center for Agricultural and Rural Development is deeply involved in research work on problems of agricultural and economic development as they relate to both U.S. and developing countries. The World Food Institute focuses on world wide problems of agricultural production and human nutritional needs. Recently, the Institute sponsored the World Food Conference held on the ISU campus from June 27 through July 1, 1976. Additional University centers and institutes which augment the Department of Economics' capacity in the field of agricultural development include: the Water Resource Research Institute, the North Central Regional Center for Rural Development, the Computation Center, the Statistical Laboratory and the University Library.

Iowa ranks among the top two or three states in terms of total agricultural production and farm income. Iowa State University intends to maintain an outstanding program of research, teaching and extension activities of direct relevance to agriculture and the associated industries and to the problems of rural (non-metropolitan) people and areas. These capabilities are complementary with those required for research and service contributions to the agricultural and related sectors of less developed countries.

The administration of the University is strongly interested in expanding its contributions to economic growth and agricultural development in such countries to the extent that appropriate funding can be found.

The 211(d) institutional grant to Iowa State University has contributed significantly toward increasing the Department of Economics' capability to assist LDC's in the development of their agricultural sectors.

A. Purpose of the Grant

Basic purpose of the original 211(d) institutional grant to Iowa State University was "to strengthen within the University, competence in the economics of agricultural development for the less developed countries, including staff support services for solutions to the problems," as specified on page one of AID Administrator Hannah's letter to Iowa State University President Parks dated June 24, 1970.

Amendment No. 3 to the 211(d) grant extended the funding and time of the grant as well as modifying the grant purpose to as follows. "The extension of time and additional funding is for the purpose of permitting your institution to utilize results from the research completed and nearly completed with the original grant through linkages formed with entities in the countries of Latin America, Africa, Asia and the Middle East. In addition, it will enable your staff to complete research studies underway and utilize the expected results of the research to the developing

countries through and in cooperation with the linkages established in these countries through the conduct of the research." (Letter from AID Grant Officer, V. C. Perelli, dated June 27, 1975).

B. Objectives of the Grant

Objectives of the original 211(d) institutional grant to Iowa State University were specified in terms of: (1) creating a framework for agricultural economists to enhance effectiveness in applying economics to important agricultural problems of developing countries; (2) increasing the competence of the University in analyzing agricultural development problems in less developed countries by providing a continuing arrangement for faculty members to conduct this research on campus and abroad and to carry on work in developing countries; (3) enabling the University to provide increased training in economic development and agricultural economics at the graduate level for students from the U.S. and the developing countries; and (4) enabling faculty members to serve AID in capacities which will contribute to their professional skills and understanding of how to accelerate agricultural growth in less developed countries and deal with the practical problems involved in the process. (Summarized from pages 3 and 4 of initial Grant Agreement).

Based upon experiences in carrying out the program and upon discussions during the following the October 1974 review process, the objectives for continuation of the program were restated as follows: (1) To identify high priority problems faced by less developed countries in improving their agricultural production,

income distribution and employment of resources and to conduct studies on these problems which promise results of an improved understanding and solution of these problems; (2) To provide training for students from the developing countries and U.S. in the conduct of these studies; (3) To increase the capacity of the University staff to train students and perform research on agricultural problems in less developed countries through participation in the training and research processes; (4) To encourage utilization of the research results in improving agricultural development in less developed countries by staff and trained students; and (5) To strive for improved information and participating networks among and between the universities and AID.

During the final reporting period the Iowa State University 211(d) program focused primarily on the reoriented objectives with activities and procedures which were an integral part of the continuing program.

III. ACCOMPLISHMENTS

Emphasis during the final reporting period was placed on the completion of research studies being carried out with cooperating entities of developing nations and the utilization of results through linkage entities in the host countries. This process has included participation of linkage entities in the selection and conduct of research studies, travel of graduate researchers to the cooperating countries for collection of field data and dissemination of research results to the cooperating entities. In addition to the benefits provided to cooperating countries from the research projects, 211(d) research assistants working with senior staff members accomplish four closely related objectives: (1) perform research on high priority agricultural problems limiting sector development in LDC's; (2) enable students and staff to become better informed on these problems and their solutions by assisting the countries with utilization of research results; (3) provide training for students as future professional workers within these countries; and (4) obtain professional recognition for their research.

During the past seven years the Department of Economics had an average of 176 students enrolled in graduate study programs as summarized in Table 1. Enrollment of foreign graduate students averaged 69 students per academic year or about 39 percent of total graduate student enrollment. Graduate researchers who were

supported, in part, under the 211(d) grant program during the reporting period included 20 students from eleven different countries as shown in Table 2. Man months of support shown in the table represent half-time appointments as 211(d) research assistants.

Since initiation of the 211(d) grant program in 1970, fifty-one research projects involving 26 separate countries have contributed to the research objective of the program, Appendix A. Additional professional articles, publications and books are shown in Appendix B. At the close of the reporting period 13 211(d) researchers were actively involved in research projects. Four of the projects were in the final stage of completion and have since been completed. Remaining active research projects are scheduled to be completed in the near future. For those projects requiring additional time beyond the termination of funding under the 211(d) grant, other support arrangements will be made, to the extent possible, to assure their completion. A summary of 211(d) graduate researchers and their areas of research concentration is provided in Table 3.

Significant linkages with cooperating entities of LDC's have been developed by the Department of Economics as a result of the 211(d) program and other agricultural development contract projects. These linkages reflect great breadth and diversity of cooperating entities. A summary of cooperating entities during the reporting period is found in Table 4 in a later section of this report.

Inter-institutional cooperation among and between 211(d) universities has been strongly supported by Iowa State University and was demonstrated again during the reporting period by the collaboration of Iowa State University and Virginia State College in carrying out a 211(d) research project in Ghana. A graduate of VSC who is presently enrolled in a graduate studies program at ISU provided the focal point for the linkage between the two institutions. His research project on agricultural credit was developed with the University of Science and Technology in Ghana as the cooperating entity. Coordination of the research project outline and on-site guidance of data collection in Ghana was provided by Dr. Michael F. Joshua of VSC who was on assignment in Ghana. This is but one example of how cooperative linkages among 211(d) institutions can strengthen the thrust of the overall program.

Approximately 20 man months of senior staff time were provided to the 211(d) program during the final reporting period in direct support of research projects and related program objectives. About one out of every four staff members from the Department were involved in providing this support. In addition, two senior staff members provided talent sharing services to AID/Washington during the reporting period.

It seems likely that most of the above mentioned Department activities concentrating on agricultural development in less developed countries would not have occurred without the stimulation and support provided by the 211(d) program. Linkages and professional interaction with cooperating entities of LDC's would not have taken place

and most of the staff and graduate researchers involved would have shifted to other areas of interest and support.

Table 1. Graduate student enrollment of foreign and U.S. students, fall quarters 1970-1976, Department of Economics, Iowa State University.

Years (Fall Quarters)	Total Enrollment (No.)	Foreign Students Enrolled (No.)	Percentage Foreign Students (Percent)
1970	175	61	34.8
1971	168	63	37.5
1972	165	68	41.2
1973	161	69	42.8
1974	178	83	46.6
1975	188	69	35.1
1976	200	70	35.0
Average	176	69	39.2

Table 2. Graduate students supported, in part, under the 211(d) grant during the final reporting period 7/1/75-9/30/76.

Graduate Student	Man/Months	Country
Asefa, Sisay	15	Ethiopia
Boloorforoosh, Mohsen	11	Iran
de las Casas, Lizardo	12	Peru
Echevarria, Julio	13	Peru
El-Hurani, M. Haithan	5	Jordan
Eshrati, Parviz	2	Iran
Faber, Doeke	3	Netherlands
Felleke, Getachew	11	Ethiopia
Hissong, Rodney	10	United States
Kulasingham, Murugasu	8	Ceylon
Lund, Mark	2	United States
Mavis, Carolyn	10	United States
Pourmoghini, Seyed-Javad	10	Iran
Rhee, Jeong	12	Korea
Shadi-Talab, Jaleh	4	Iran
Saygideger, Orhan	10	Turkey
Utley, Sally	2	United States
Vaitheswaran, R.	1	India
Veramallay, Ashton	10	Guyana
Yerby, Wayne	13	United States
Total Man/Months	164 M/M	
Average Man/Months	8.2 M/M	

^{1/} Man months of graduate student support represent half time appointments as 211(d) research assistants.

Table 3. Areas of research concentration supported under the 211(d) institutional grant.

Researcher	Area of Concentration
<u>Active Projects, 9/30/76</u>	
Asefa, Sisay	Improved farm organizational and operational plans for a sub-sector of Ethiopian agriculture.
Boloorforoosh, Mohsen	Estimation of the demand for meat in Iran.
DeLasCasas, Lizardo	A theoretical and applied approach towards the formulation of alternative agricultural sector policies in support of the Peruvian agricultural planning process.
Echevarria, Julio	An application of a programming model to Peruvian agriculture.
Getachew, Felleke	An interdisciplinary analysis of selected mechanization of small farms in the central highland of Ethiopia.
Hissong, Rodney	Rural community development and growth center in Thailand.
Mavis, Carolyn	The effects of a dual economy on the pattern of development in Africa & America.
Pourmoghim, Javad	The influence of general and agricultural development on value and composition of agricultural trade in currently developing countries.
Rhee, Jeong	Analysis of the inter-sectoral relationship between the agricultural sector and the industrial sector mediated by the environmental quality in Korea.
Saygideger, Orhan	Development of a linear programming model of interregional competition, agricultural policy and development that can be useful for the purposes of short-run and long-run planning of agriculture in Turkey.
Shadi-Talab, Jaleh	Factors affecting the farmer's adoption of agricultural technologies (Iran)

Table 3 (cont.)

Veramallay, Ashton	Evaluation of water resource irrigation and drainage projects in Guyana.
Yerby, Wayne	Analysis of agricultural credit system in Ghana.
<u>Prior Projects</u>	
Applegate, Michael J.	A multi-sectoral linear programming approach to measurement of the economic costs of income redistribution in Guatemala.
Caballero, Fructoso	Dynamism and inequality in the Mexican economy.
Dambe, Gunars	Planning for more labor intensive and more productive agriculture in Colombia.
Delgado, Mario	Economic, psychological, and mathematical consideration in economic development in Colombia.
Donnadieux, Enrique	A microeconomic analysis of specific policy effects on two agricultural regions in Mexico: An application of a recursive programming model.
El-Hurani, Mohamed	Economic analysis of the variation and development of the wheat subsector of Jordan.
Eshrati, Parviz	To study existing systems of irrigation in the area; find cost and returns for alternative irrigation system and compare and evaluate these irrigation systems using a multi linear program (Iran).
Ghobadi, Farrokh	Estimated impacts of variation in wheat price policy in northern Iran.
Graber, Eric	Social well-being in Costa Rican communities: An application of social indicator methodology and analysis of structural relationships.
Johnston, Tim	Income potential of small farms in Guatemala.
Kayir, Sahika	Planning for growth, the case of Turkey.

Table 3. (cont.)

Kulasingam, Murugasu	Distribution of fiscal incidence in Sri Lanka by income groups & economic sectors.
Lund, Mark	Identifying, developing, & adopting technologies appropriated for rural development with applications to Huari Province in Peru.
Messerschmidt, Daniel	To delineate the relationships that exist between the international sector and domestic monetary sector in the Guatemalan economy.
Mojtahed, Ahmad	Economics of alternative methods of increasing meat production in Iran.
Ng, Lu Siong	An income distribution and employment consistency model of the Philippines.
Pagoulatos, Emilios	The effects of agriculture and trade policies on European economic integration.
Pou, Claudio	Optimal allocation of agricultural resources in the development area of Patacamaya, Bolivia. A linear programming approach.
Utley, Sally Ann	Evaluation of selected impacts of introducing mechanized processing of cassava into Gari in Nigeria.
Vaitheswaran, R.	Employment alternatives in India in the context of technological change.
Vermally, Ashton	Agricultural development through agrarian reform in Guyana.

IV. IMPACT OF GRANT SUPPORTED ACTIVITIES

Grant supported activities have strengthened ISU's competence in the economics of agricultural development for less developed countries. More than 25 staff members from the Department of Economic have gained first-hand experience of development problems and needs by serving on overseas assignments in more than 35 different countries. Many of these staff members could not have received the benefit of overseas experience except for the interest and support provided by the 211(d) Grant. In addition, 34 graduate researchers from 16 different countries have received training and have participated in development research projects under the grant. Benefits from this outreach program are also found in the numerous interactions between Department staff members and professionals from LDC's as well as from the many strong and effective working linkages established with institutions and government entities of other countries.

Development research carried out by the Department of Economics since 1970 has resulted in the completion of more than 45 research dissertations and theses covering diverse development topics in more than 25 separate countries. Five additional research projects are currently underway and will be completed in the near future. A summary of research projects is found in Appendix A.

The 211(d) Grant has stimulated both staff and student interest in the economics of agricultural development. The number of courses treating economic development issues has been expanded. Currently, 18 different courses (quarterly basis) are being offered on economic development and related topics. Relevant courses on international subject matter areas are summarized in Appendix C.

The 211(d) Grant and its induced interest in the agricultural sector of developing countries also contributed to the establishment of the World Food Institute in 1971 and to the holding of the World Food Conference at Iowa State University in June of 1976.

V. OTHER RESOURCES FOR GRANT RELATED ACTIVITIES

Major resources available for Grant related activities include staff support, facilities, and related research services. Twelve senior staff members provided sustained support to the 211(d) program during the life of the Grant. Grant supported researchers also benefited from the utilization of library and computational facilities as well as from office space and administrative support services. Total other resource support benefits are estimated at about \$60,000 per year during the life of the project.

AID technical assistance contracts for work performed in Peru and Thailand have provided additional opportunities for activities complementary to 211(d) objectives within the general context of methodological and informational developments.

VI. UTILIZATION OF INSTITUTIONAL RESPONSE CAPABILITIES

The 211(d) institutional grant has enabled Iowa State University to respond to many different requests for economic development assistance. Development assistance provided by the Department of Economics has included staff talent sharing assignments with AID, short-term technical assistance to developing nations, and in-depth research assignments with cooperating entities of LDC's.

During the final reporting period two senior staff members from the Department were on talent sharing assignments with AID in Washington. More than ten man years of long-term talent sharing services have been provided to AID during the past six years. Three man years of the long-term services were supplied to USAID missions in developing countries.

The Department of Economics has also provided more than 30 man months of short-term senior staff technical assistance to cooperating agencies of developing nations during the past six years. Short-term technical assistance has been provided to developing countries of Africa, Central America, Southeast Asia, South America, and the Near East. During the final reporting period short-term technical assistance assignments were carried out in Chad, Sri Lanka, Guyana and Jordan.

Cooperative research projects establish the base for direct linkages with development entities of other countries and facilitate fuller utilization of research results. They also permit the

involvement and interaction of researchers from the Department with professionals from the developing countries. During the final reporting period, eleven research projects were carried out with cooperating entities from Ethiopia, Peru, Jordan, Sri Lanka, Thailand, Iran, Guyana, and Ghana as summarized in Table 4. Seven of the projects have been completed and the remainder will be completed in the near future.

Table 4. Cooperative research projects with other countries during the final reporting period, researchers and entities.

Graduate Researchers (Staff Supervisor)	Country	Entity
Asefa, Sisay (James)	Ethiopia	Minister of Agriculture, Agricultural Development Unit (CADU), Chilalo
Boloorforoosh, Mohsen (Paulsen)	Iran	Planning Organization, Agriculture and Live- stock Directorate
de las Cases, Lizardo (Van de Wetering)	Peru	Ministry of Agriculture
Echevarria, Julio (Van de Wetering)	Peru	National Agrarian University
Hissong, Rodney (Prescott)	Thailand	Ministry of Agriculture and Cooperatives, Division of Agricultural Economics
El-Hurani, M. Haithan (Paulsen)	Jordan	Royal Scientific Society
Kulasingam, Murugasu (Meyer)	Sri Lanka	Central Bank
Lund, Mark (Timmons)	Peru	Ministry of Agriculture
Shadi-Talab, Jaleh (Beal)	Iran	Ministry of Cooperation and Rural Affairs
Veramallay, Ashton (Timmons)	Guyana	Ministry of National Development, Hydraulics Division
Yerby, Wayne (Weiskoff/Hoffmann)	Ghana	University of Science and Technology ¹

¹Research project carried out in cooperation with the Virginia State College technical assistance project in Ghana.

VII. SUMMARY OF GRANT EXPENDITURES

The original 211(d) Grant to Iowa State University was terminated on September 30, 1976. Expenditures during the final reporting period and cumulative prior expenditures are summarized in Table 5. Distribution of the final reporting period's expenditures is shown in Table 6. A total of \$131,045.59 was expended from grant funds during the period July 1, 1975 through September 30, 1976. The major share of the expenditures, 52.4 percent, was for salaries and benefits of graduate researchers. Travel costs comprise 14.0 percent of the total, tuition and fees 17.2 percent, and other direct costs comprise 7.3 percent of total expenditures. Line item expenditures shown are subject to final revision due to verification and adjustment of some individual expense classifications.

The major expenditure item throughout the life of the project was for salary support of graduate student researchers, 48.6 percent. Important expenditure categories also included professional and clerical support (17.0 percent), travel and transportation (10.7 percent), tuition and fees (15.7 percent), and other direct costs (7.5 percent). Other funding sources contributed significantly to support of the professional services and other direct cost categories.

Although the original Grant terminated on September 30, 1976, the Department of Economics continues to have a strong interest in

maintaining and expanding its contributions to economic growth and agricultural development of the less developed countries. The Department and the University are actively searching for linkages and appropriate funding in order that the strong professional resources developed under the 211(d) grant shall not disperse to other funded areas of interest but continue to make an effective contribution to international economic development programs in the future.

Table 5. Expenditure report for 211(d) Grant AID/csd 2824, Department of Economics, Iowa State University. Reporting period July 1, 1975 to September 30, 1976.

Item	Cumulative Total 7/1/70 - 6/30/75	Final Period 7/1/75 - 9/30/76	TOTAL ^{2/}
Salaries and Benefits (Professional and Clerical) (Graduate Students)	\$227,859.19 (67,908.75) (159,950.44)	\$ 80,488.05 (11,853.90) (68,634.15)	\$308,347.24 (79,762.65) (228,584.59)
Travel and Transportation	32,131.89	18,360.41	50,492.30
Tuition and Fees	51,202.50	22,549.75	73,752.25
Equipment	2,129.88	111.37	2,241.25
Other Direct Costs:			
Supplies and Materials	12,054.54	7,283.62	19,338.16
Computer Services	5,661.58	900.76	6,562.34
Communications	4,488.37	838.85	5,327.22
Printing	2,274.44	53.84	2,328.28
Workshops and Seminars	1,152.02	20.20	1,172.22
Other ^{2/}	---	438.74	438.74
TOTAL	\$338,954.41	\$131,045.59	\$470,000.00

^{1/}Line item totals may differ slightly in final financial report due to verification and adjustment of some individual expense classifications.

^{2/}Expenditure of \$438.74 for final report preparation authorized by the Contracting Officer in a letter dated February 4, 1977.

Table 6. Distribution of expenditures during final reporting period 7/1/75 to 9/30/76, 211(d) Grant AID/csd 2824, Department of Economics, Iowa State University.

Item			Total	Percent
<u>Salaries and Benefits</u> ^{1/}	Salaries	Benefits		
Professional and Clerical:				
Hoffmann, R.				
Shupp, S.				
Williams, S.				
Hourly Clerical Services				
Sub-total	<u>\$10,558.63</u>	<u>\$1,295.97</u>	<u>\$11,853.90</u>	<u>9.05</u>
Graduate Students				
Asefa, S.				
Bolorforoosh, M.				
de las Casas, L.				
Echevarria, J.				
El-Hurani, M.				
Eshrati, P.				
Faber, D.				
Felleke, G.				
Hissong, R.				
Kulasingham, M.				
Lund, M.				
Mavis, C.				
Pourmoghin, S.				
Rhee, J.				
Shadi-Talab, J.				
Saygideger, O.				
Utley, S.				
Vaitheswaran, R.				
Veramallay, A.				
Yerby, W.				
Sub-total	<u>\$66,296.08</u>	<u>\$2,338.07</u>	<u>\$68,634.15</u>	<u>52.37</u>

^{1/} Individual salary and benefit line items are not included in this table because of the personal nature of the information and in consideration of the privacy of the respective individuals listed.

Item	Total	Percent
Travel and Transportation	\$18,360.41	14.01
Tuition and Fees	22,549.75	17.21
Equipment	111.37	0.08
Other Direct Costs:		
Supplies and Materials	7,283.62	
Computer Services	900.76	
Communications	838.85	
Printing	53.84	
Workshops and Seminars	20.20	
Other	438.74	
Sub-total	9,536.01	7.28
TOTAL	\$131,045.59	100.00

VIII. INVOLVEMENT OF MINORITY PERSONNEL AND WOMEN

It is the firm position of Iowa State University to provide equal employment opportunities to all women and members of minority groups. The Department of Economics firmly supports the policy position of the University. In the furtherance of fulfilling this goal the Department has established linkages with Virginia State College and other educational institutions to provide graduate study opportunities and support for minority personnel.

Of the five U.S. nationals who were receiving graduate study support at the end of the 211(d) project, two were women and two were from minority groups. One of the two women was from a minority group.

APPENDIX A

AGRICULTURAL AND ECONOMIC

DEVELOPMENT RESEARCH DISSERTATIONS

1971 - 1977

APPENDIX A

AGRICULTURAL AND ECONOMIC DEVELOPMENT RESEARCH
PAPERS NEARING COMPLETION OR RECENTLY COMPLETED
F/76 - SS/77

<u>Name</u>	<u>Title</u>	<u>Date</u>
*De las Casas, Lizardo Universidad Agraria, B.S.	Theoretical and Applied Approach for Formulating Alternative Agricultural Sector Policies in Support of Peruvian Agricultural Planning Process	SS/77
*Echevarria, Julio Universidad Agraria, B.S. University of Minnesota, M.S.	An Application of a Linear Programming Model for Agricultural Planning in Peru	SS/77
*Hissong, Rodney Northwest Missouri State Iowa State University, B.S.	Rural Community Development and Growth Center Analysis in Thailand	SS/77
*Saygideger, Orhan University of Ankara, B.S.	Spatial Agricultural Structure with a Multi- Objective Linear Programming Approach	S/77
*Shadi-Talab, Jaleh Tehran University, B.S. Ball State University, M.S.	Factors Affecting the Adoption of Agricultural Technologies in Less Developed Countries (Iran)	S/77
*Bolorforoosh, M. Nat. University of Iran, B.S.	Demand Estimation of Meat in Iran	W/77
Prommani, Bootam Kasetsart University, B.S.	An Application of Dynamic Programming for Farm Planning in Agro-Economic Zone 6, the North of Thailand	W/77
*Yerby, Wayne Virginia State College, B.A.	A Review of Institutional Agricultural Credit in Ghana with Special Reference to Loan Repayment Problems	W/77
*Faber, Doeke McGill University, B.S.	Can Agriculture Feed the World: A World Food Analysis	F/76
Ooraikul, Anchalee Kasetsart University, B.S.	Price Elasticity of Marketable Surplus of Thai Rice	F/76

*Research supported, in part, by a 211(d) Grant to Iowa State University.

APPENDIX A

AGRICULTURAL AND ECONOMIC DEVELOPMENT
RESEARCH THESES AND DISSERTATIONS
W/71 - SS/76

<u>Name</u>	<u>Title</u>	<u>Date Degree Received</u>
*Asefa, Sisay Central College, B.A.	Optimal Resource Allocation and Farm Plan Adjustments for Small Farms in Ethiopian Agriculture: A Case Study	SS/76
*Veramallay, Ashton University of Wisconsin- LaCrosse, B.S. Iowa State University, M.S.	An Evaluation of Water Resource Developments in Guyana: With Application to Selected Drainage and Irrigation Projects	SS/76
*Kulasingam, Murugaser University of London, B.S.C. Iowa State University, M.S.	Distribution of Fiscal Incidence in Sri Lanka by Income Groups and Economic Sectors	W/76
*Lund, Mark Augsburg College, B.A.	Identifying, Developing, and Adopting Technologies Appropriate for Rural Development with Applications to Huari Province in Peru	F/75
*Ghobadi, Farrokh Sacramento State College, B.A. Iowa State University, M.S..	Estimated Impacts of Variation in Wheat Price Policy in Northern Iran	SS/75
*Rhee, Jeong J. Seoul National University of Korea, B.S.	Economic Growth, Technological Changes, and Environmental Problems in Japan	F/75
*El-Hurani, Mohamed H. Cairo University, B.S. Portland State University, M.S.	Economic Analysis of the Variation and Development of the Wheat Subsector of Jordan	F/75
Maji, Chandi Charan Calcutta University, B.S. Indian Agricultural Research Institute, M.S.	Intertemporal Allocation of Irrigation Water in the Mayurakshi Project (India): An Application of Deterministic and Chance-Constrained Linear Programming	W/75
*Ng, Lu Siong Iowa State University, B.S.	An Income Distribution and Employment Consistency Model of the Philippines	W/75

*Research supported, in part, by a 211d Grant to Iowa State University.

<u>Name</u>	<u>Title</u>	<u>Date Degree Received</u>
Sugai, Yoshihiko Tokyo University of Agriculture, B.S. Federal University of Minas Gerais, M.S.	A Quota System Policy and It's Impact on the Labor Market in the Sugarcane Industry Analyses Through Dynamic Linear Programming Procedure, Sao Paulo, Brazil	F/74
*Johnston, Tim David Central Michigan University, B.S. Iowa State University, M.S.	Income Potential of Small Farms in Guatemala	F/74
*Dambe, Gunars Iowa State University, B.S. Iowa State University, M.S.	Planning for More Labor Intensive and More Productive Agriculture in Colombia	SS/74
Kayir, Sahika American College for Girls, B.A. Wittenburg University, M.S.	Planning for Growth, The Case of Turkey	SS/74
Mulhollandy, Jose T. University of Buenos Aires, B.S. Iowa State University, M.S.	Technological Change: The Case of Corn Production in the Argentine Pampas	SS/73
*Pagoulatos, Emilios University of Rome, Laurea Dottore	The Effects of Agricultural and Trade Policies on European Economic Integration	SS/73
*Applegate, Michael J. Brigham Young University, B.A.	A Multi-sectoral Linear Programming Approach to The Economic Costs of Income Redistribution in Guatemala	F/73
Abalu, George O. University of Wisconsin, B.S. Iowa State University, M.S.	Optimal Investment Decisions in Perennial Crop Production in Cameroon: A Dynamic Programming Approach	S/73
Martinez, Juan C. University of Buenos Aires, Licentiate in Econ Iowa State University, M.S.	On the Economics of Technological Change: Induced Innovation in Argentine Agriculture	S/73
Amat-y-Leon, Carlos Agrarian University, B.S.	An Income Analysis of the Demand for Food in the Lima Metropolitan Area	SS/73

<u>Name</u>	<u>Title</u>	<u>Date Degree Received</u>
Lu, Chung Chi Taiwan Provincial Chung-Hsing University, B.S. Iowa State University, M.S.	The Role of Food Aid, Agricultural Development and Capital Formation in Economic Development: A Case Study in Taiwan	W/73
*Pou, Claudio Universidad Catolica, M.A. Ibid, Ph.D. Pontificia, M.A.	Optimal Allocation of Agricultural Resources in the Development Area of Patacamaya, Bolivia. A Linear Programming Approach	SS/72
Sheraab, Hisham M. University of Assuit, B.S.	Agricultural Development in Jordan with Full Utilization of Resources	F/72
Crown, Robert W. Queen's University, B.A. University of Guelph, M.S.	A Model of Income Distribution by Size-Class With Application to the Results of Technical Change (India)	F/74
Chirapanda, Suthiporn University of New England, B.E.	Linear Programming Models of Interregional Competition for Economic Planning of Thai Agriculture	F/72
Papageorgiou, Efstathios Iowa State University, B.S. Ibid, M.S.	An Econometric Analysis of the Structure of the Greek Economy and its Development Prospects	SS/72
Ojo, Gabriel Idowu O. University of Ibadan, B.S. Iowa State University, M.S.	An Econometric-Simulation Model of the Nigerian Economy	SS/72
Ogunfowora, Olabisi University of Ibadan, B. Sc. University of Reading, M. Sc. Ibid, Dip.	Derived Resource Demand, Product Supply and Farm Policy in the North Central State of Nigeria	SS/72
Prantilla, Edmundo University of the Philippines, B.S.A. Ibid, M.S.	Economic Optimization Models of Multiple Cropping System: Applied to the Philippines	S/72
Muljana, Bernardus S. University of Indonesia Doctorandus	The Role of Agricultural Exports in Indonesia's Economic Development	W/72

<u>Name</u>	<u>Title</u>	<u>Date Degree Received</u>
Vermallay, Ashton Wisconsin State, B.S.	Agricultural Development Through Agrarian Reform in Guyana	S/72
Keller, Elmo A., Jr. Brigham Young University, B.S. Ibid, M.S.	The Computation of Optimal Growth in Economic Models	W/72
Ahmed, Iftikhar University of Dacca, B.S. Ibid, M.A.	Unemployment and Underemployment in Pakistan	W/72
Katanani, Ahmad K. American University of Beirut, B.S. Ibid, M.S.	Policies and Models for Planning the Economic Development of the Non-oil Sector in Saudi Arabia	F/71
Conley, Dennis M. Iowa State University, B.S.	A Simulation of the Domestic and Foreign Distribution of United States' Surplus Grain	F/71
Fullerton, Herbert H. Utah State University, B.S. Ibid, M.S.	An Economic Simulation Model for Development and Resource Planning	F/71
Hansen, David E. University of California, B.S. Ibid, M.S.	Identification of Economic Impediments to Utilization of Mexico's Idle Lands and Policy Implications for the Ejido and Private Sectors	F/71
Fekete, Ferenc Hungarian University of Economics; D.Ec.Sc., Hungarian Academy of Sciences, D. Sci.	Economics of Cooperative Farming - Objectives and Optima in Hungary	SS/71
Rogers, Keith Daniel Iowa State University, B.S. Ibid, M.S.	Theory and Application of Food Aid in Economic Development	S/71
Seminario, Alejandro Luis Universidad Agraria la Molina, Peru: Ingeniero Agronomo	Economics of Irrigation Regularization in the Moquegua Valley, Peru	S/71

<u>Name</u>	<u>Title</u>	<u>Date Degree Received</u>
Andrade, Francisco J. Escuela Nacional de Agriculture, B.S. University of Wisconsin, M.S.	Some Normative Aspects of Planning in the Maule Region, Chile	S/71
Hexem, Roger South Dakota State University, B.S. University of Nebraska, M.S.	Factors Affecting the Economic and Social Well-Being of Agriculturists in Less-Developed Countries and Agriculture's Contribution to General Economic Expansion	W/71

APPENDIX B

SELECTED PUBLICATIONS ON

AGRICULTURAL & ECONOMIC DEVELOPMENT

1973 - Forward

- Blakeslee, Leroy L., Earl O. Heady, and Charles F. Framingham. World Food Production, Demand, and Trade, Iowa State University Press, Ames, Iowa, 1973.
- Crown, Robert W. and V. Nagadevara, "Tendencies in Relative Economic Efficiency and Their Consequences," Indian Journal of Agricultural Economics, July - September 1973.
- Hoffmann, Randall, "Planificacion Mecanizada para los Fines de Produccion Agricola de las Empresas Asociativas en el Peru," ("Computerized Production Planning for Associative Farm Enterprises in Peru,") Ministry of Food - Iowa Universities Mission, Lima, Peru, 1975. (Spanish and English).
- Lapan, Harvey, "Localized Technical Progress and Transfer of Technology and Economic Development," Journal of Economic Theory, December 1973.
- Merrill, William C., The Long-Run Prospects for Increasing Income Levels in Guatemala's Highlands, National Planning Council of Guatemala, January 1974.
- Merrill, William C, Fletcher, Lehman B., Hoffmann, Randall A., Panama's Economic Development: The Role of Agriculture. Iowa State University Press, Ames, Iowa, 1975.
- Seagraves, James, "Values, Costs and Pricing Alternatives for Irrigation Water: Canete, Peru," Iowa Universities Mission Technical Report, Lima, Peru, July, 1975.
- Srivastava, Uma K. and Earl O. Heady, "Technological Change and Relative Factor Shares in Indian Agriculture: An Empirical Analysis," American Journal of Agricultural Economics, Vol. 55, No. 3, August 1973.
- Srivastava, Uma K., Earl O. Heady, Keith D. Rogers and Leo V. Mayer, Food Aid and International Economic Growth, Iowa State University Press, Ames, Iowa, forthcoming.
- Srivastava, Uma K., Vishnuprasad Negadevara and Earl O. Heady, "Resource Productivity, Returns to Scale and Farm Size in Indian Agriculture: Some Recent Evidence," The Australian Journal of Agricultural Economics.
- Van de Wetering, Hylke, "Agrarian Reform and Agricultural Employment," Ministry of Agriculture - Iowa Universities Mission, Lima, Peru, 1975, (In Spanish).

_____, "Criteria for the Determination of Fertilizer Price Policy," Ministry of Agriculture - Iowa Universities Mission, Lima, Peru, 1974, (In Spanish).

_____, "Price Policy and Agricultural Production," Ministry of Agriculture - Iowa Universities Mission, Lima, Peru, 1975, (In Spanish).

_____, "Social Interest Criteria for the Assignment of Cultivable Land within the Framework of the National Crop Plan," Ministry of Agriculture - Iowa Universities Mission, Lima, Peru, 1975, (In Spanish).

1972 - 73

Christian, James W. and Pagoulatos, Emilios, "Domestic Financial Markets In Developing Economies: An Econometric Analysis," *Kyklos*, XXVI, 75-90, 1973.

Crown, Robert W. and Heady, Earl, Policy Integration in Canadian Agriculture, Iowa State Press, 1st ed., 1972.

Heady, Earl O., "A Five-Sector Model of Agricultural Development, Industrialization and Food Aid in a Dual Economy," C.A.R.D. Report No. 43T, Center for Agricultural and Rural Development, Iowa State University, Ames, Iowa.

_____, "Application of a Spatial, Interregional and Intersector Model of Water Allocation for the Nation to Evaluate Water Demands, Policy and Substitution," International Symposium for the Planification of Water and Hydrology, Mexico City, 1972, Subsecretariat of Planeacion, pp. 93-99.

_____, "Elements in Making Rural Development Go," Increasing Understanding of Public Problems and Policies, Farm Foundation, Chicago, 1972, pp. 45-55.

_____, "Growth and Developmental Effects of Food Shipments Under Public Law 480." Center for Agricultural and Rural Development, Iowa State University, Ames, Iowa, Sept. 1972, pp. 1-130.

_____, "Marginal Rates of Substitution of Fertilizer for Land Derived from Experimental Production Functions," Office of Agricultural Policy, International Development Center, United States Agency for Development, Farozsons Ltd., Rauelpindi, 1972.

_____, "Resource Productivity, Returns to Scale and Farm Size in Indian Agriculture," *Australian Journal of Agricultural Economics*, May, 1972, pp. 143-151.

_____, "Utilization of U.S. Farm Surpluses for Welfare and Development Programs at Home and Abroad," C.A.R.D. Report No. 41, Center for Agricultural and Rural Development, Iowa State University, Ames, Iowa.

Ferrill, William, Fletcher, Lehman, and Hoffmann, Randall, An Analysis of the Agricultural Sector of Panama, Ministry of Agriculture, Panama, June, 1973.

Horbecke, Erik and Dambe, Gunars, "Comparative Analysis of Agricultural Development and Employment Performance and Planning and Future Employment Perspectives," FAO, United Nations, 1972.

Timmons, John F., "Effects of Land Tenure on Economic Growth with Implications for Farm Size," in Proceedings of Aspects on Land Tenure Seminar, International Institute of Tropical Agriculture, Ibadan, Nigeria, July 1972, Journal Paper #J-7376, Iowa Agricultural and Home Economic Experimental Station, Ames, Iowa.

Van de Wetering, Hylke, "Planning in Stages: Multi Level Planning at the National, Regional and Sector Level," Inter-American Institute of Agricultural Sciences, Bogota, Columbia, 1972.

1971 - 72

Heady, Earl O., "Programming Models Applied to Efficient Interregional Agricultural Production Patterns," Chapter V, Programming for Optimal Decisions - Penguin Modern Management Readings, P. G. Moore and S. D. Hodges (ed)., Baltimore, 1971.

_____, "Green Revolution and Farm Income Distribution," The Economic and Political Weekly, Vol. VI, No. 52, pp. 163-172.

_____, "Farm Size and Optimization Under Tenure, Collective and State Structures," American Journal of Agricultural Economics, Vol. 54, No. 1, pp. 143-145.

_____, "Future Farm Programs," Proceedings 1971 National Farm Institute, Iowa State University Press, pp. 46-48, Ames, 1972.

_____, "Programs for the Economics of Agriculture in India," Expanding Horizons for Indian Agriculture, Ford Foundation, Vol. 8, Caxton Press Private Limited, New Dehli, 1972.

_____, "Modified Price, Production and Income Impacts of Food Aid Under Market Differentiated Distribution," American Journal of Agricultural Economics, Vol. 54, No. 2, pp. 201-208.

Thorbecke, Erik, "Project Selection and Macroeconomic Objectives: A Methodology Applied to Peruvian Irrigation Projects," (with Stephen E. McGaughey), American Journal of Agricultural Economics, February, 1972.

_____, "Unemployment and Underemployment in the Developing World," in Barbara Ward et al. (ed)., The Widening Gap Development in the 1970's, Columbia University Press, 1971.

_____, "Preparing Sector Programs for Agriculture, Sector Analysis, Models and Practice," Paper prepared for Conference on Strategies for Agricultural Development in the '70's, Food Research Institute, Stanford University, December, 1971.

_____, "A Consistency Framework for Employment, Income Distribution and Output Projections Applied to Colombia," with J. T. Sengupta. Monograph prepared for the Development Reserach Center of the International Bank for Reconstruction and Development, to be published in a North Holland Publishing Co. volume on Employment Studies.

Thorbecke, E., Comments on "The Argentine State and Economic Growth: A Historical Review," by Carlos F. Diaz Alejandro in G. Ranis, ed., Government and Economic Development (Yale University Press, New Haven, 1971).

_____, "What is Unemployment?", CERES FAO Review, Nov.-Dec., 1970.

_____, "A Methodology to Derive Consistent Agricultural Projections Under Technological Change Within the Context of Overall Economic Growth and Alternative Economic Distributions," FAO, Policy Advisory Bureau, July, 1971.

Timmons, J. F., "Current Land Reforms in East Pakistan," February 1971, Land Economics, Vol. 47, No. 1, with Iftikhar Ahmed.

_____, "Managing Natural Resources Through Land Tenure Structures," Jan.-Feb. 1971, Journal of Soil and Water Conservation, Vol. 26, No. 1, Journal Paper No. J-6659 of the Iowa Agr. and H. Ec. Exp. Sta., with J. M. Cormack.

_____, "World Farm Tenancy," Encyclopedia Britannica, 1970, rev. ed.

Van de Wetering, H., "A First Measurement of the Rate of Unemployment of the Peruvian Agricultural Labor Force," (paper presented at the L.A. regional meeting of the Ford Foundation, Caracas, May 1971).

_____, "The Potential Impact of Peruvian Agrarian Reform Law 17716 on Agricultural and Non-agricultural Productivity," (working document Iowa Universities Mission, Lima, Peru, 1971).

1970 - 71

Christian, James, "Análisis Macro-Sectorial de la Economía Panamena," in Estudios Sobre el Sistema Monetario y Bancario de Panama y Otros Problemas Sociales, Estudios Especiales No. 2 de la Dirección General de Planificación de la República de Panama, June 1970.

_____, "Domestic Financial Markets in Developing Economies: A Theoretical and Empirical Analysis," with Emiliós Pagoulatos, June 1971.

Fletcher, L., Graber, E., Merrill, W., and Thorbecke, E., Guatemala's Economic Development: The Role of Agriculture, Iowa State University Press, Ames, 1970.

_____ and Merrill, W., "Product Markets: A Discussion," in Institutions in Agricultural Development, Melvin G. Blase, ed., Iowa State University Press, Ames, 1971.

_____, "Low Investment Levels in Uruguayan Agriculture: A Comment," in Land Economics, February 1971.

_____, and Merrill, W., "Uruguay's Agricultural Sector: Priorities for Policies, Investment Programs and Projects," Inter-American Development Bank, Papers on Agricultural Development No. 9, July 1970.

Hoffmann, Randall, "Agricultural Sector Review-Panama," report prepared for USAID Panama, June 1971.

Merrill, W., Fletcher, L., and Hanrahan, M., Vegetable Production and Marketing in Guatemala, USAID-Guatemala Report, 1971.

Sengupta, J. K., and Thorbecke, E., "Employment Response in an Input-Output Framework Under Technological Change," paper prepared for the Fifth International Conference on Input-Output Techniques, Geneva, January 11-15, 1971.

Sengupta, J. K. and Thorbecke, E., "Consistency Model Analyzing Sectoral Employment in an Input-Output Framework under Technological Change," paper prepared for the Development Research Center of the International Bank for Reconstruction and Development, May 1971.

Thorbecke, E., "The World Food Problem: World Famine or Food Surpluses by 1980?", Journal of International Affairs, Vol. XXIV, 1970.

_____, "Unemployment and Underemployment in the Developing World," testimony before the Foreign Economic Policy Subcommittee of the Joint Economic Committee of Congress, May 1970 (in A Foreign Economic Policy for the 1970's, Hearings before the Subcommittee on Foreign Economic Policy of the Joint Economic Committee, May 1970), pp. 704-719.

_____, "Unemployment and Underemployment in the Developing World," in Barbara Ward, et. al., editors, The Widening Gap, Development in the 1970's, Columbia University Press, 1971.

_____, and Stoutjesdijk, A., Employment and Output, A Methodology Applied to Peru and Guatemala (Organization for Economic Cooperation and Development, Development Centre, Paris, 1970).

Occasional Papers

211(d) Grant AID/csd - 2824
in support of

The Agency for International Development
Institutional Grants Program

1. Karl A. Fox, "Combining Economic and Non-Economic Objectives in Development Planning: Problems of Concept and Measurement," November, 1973.
2. Gunars Dambe and Erik Thorbecke, "Agricultural Productivity and Employment in Taiwan," February, 1974.
3. Gunars Dambe and Erik Thorbecke, "Agricultural Production and Employment in Colombia," February, 1974.

4. Gunars Dambe and Erik Thorbecke, "Agricultural Production and Employment in Ivory Coast," February, 1974.
5. Erik Thorbecke and Gunars Dambe, "Comparative Analysis and Typology of Agricultural Development Performance and Strategy," April, 1974.
6. Eric S. Graber, "Potato Supply, Demand and Marketing in Central Peru," May, 1974.
7. Sahika Kayir, "Sectoral Credit and Investment Patterns in Turkey: 1963-70,' August, 1974.
8. Sahika F. Kayir and Jorge F. Checkley, "Structural Changes in the Turkish Economy: 1962-1967," July, 1974.
9. Dennis M. Warren, "Bibliography Vocabulary of the Akan Language of Ghana," Indiana University, Bloomington, Indiana. 1976.

APPENDIX C

RELEVANT COURSES IN
INTERNATIONAL SUBJECT MATTER ARE
FOR L.D.C. AND U.S. STUDENTS

Course Number	Title and Content
306	<p>COMPARATIVE ECONOMIC SYSTEMS</p> <p>Analysis and comparison of alternative economic systems, particularly capitalism, democratic partial socialism, market socialism, and command socialism; contemporary systems examined include those of the United States, France, Sweden, Yugoslavia, Soviet Union, and China; emphasis on underlying theory, institutions, and selected problems associated with respective economic systems; prospects for institutional change and convergence.</p>
411	<p>ECONOMIC DEVELOPMENT</p> <p>Analysis of capital formation and capital allocation problems; relation of transportation, communications, and resource availability to development; population and education problems as they relate to growth.</p>
412	<p>ECONOMICS OF AGRICULTURAL DEVELOPMENT</p> <p>Process of increasing agricultural resource productivity: agricultural investment alternative and allocation criteria; benefit-cost analysis, organizational and institutional considerations, agricultural development policies, and aid programs.</p>
455	<p>INTERNATIONAL ECONOMICS</p> <p>Principles of international trade, exchange rates, and balance of payments adjustments. The role of trade in economic development and the interdependencies among nations. Commercial and foreign investment policies. Foreign trade and American agriculture and industry.</p>
456	<p>INTERNATIONAL FINANCE</p> <p>Methods of financing international trade. The foreign exchange and the gold standard. International financial institutions, short- and long-term capital movements, and problems of international liquidity.</p>
475X	<p>MARXIAN ECONOMICS</p> <p>An analysis of <u>Marx's Capital</u> and other writings as exploration, the contemporary economic system.</p>
512	<p>AGRARIAN REFORM AND ECONOMIC DEVELOPMENT</p> <p>Meaning of economic development, underdevelopment, overpopulation, agrarian structures as obstacles to economic development. Improving agrarian structures through national, regional, and United Nations actions. Comparative structural change in countries.</p>

Course Number	Title and Content
520	<p>HUMAN CAPITAL FORMATION IN RURAL AREAS Nature and process of human capital formation; application of benefit-cost analysis to human investments in agriculture; costs and benefits of educational, health, and mobility investments in rural people; and demands for human investment resources and facilities in rural areas.</p>
535	<p>ECONOMIC DEVELOPMENT AND TRANSFORMATION OF AGRICULTURE IN DEVELOPING COUNTRIES Relation of economic growth to factor prices and the technological and firm structure; firm behavior and aggregate response in product supply and factor demand; developmental needs for transformation of agriculture and resource mobility; supply and resource problems under different stages of development; policy needs for alternative problems in development.</p>
541	<p>AGRICULTURE IN THE WORLD ECONOMY The varied economic role of agriculture around the world and during economic development, regional and commodity trade patterns and trends, trade regulation mechanisms, trade policies, and agricultural development assistance.</p>
555	<p>ADVANCED INTERNATIONAL ECONOMICS Modern theory of international trade; welfare and distributional impact of trade and tariffs, economic development and interdependencies, growth, and trade.</p>
557	<p>ADVANCED INTERNATIONAL FINANCE Theory of foreign exchange, mechanism of adjustments in the balance of payments, exchange speculation and the forward exchange market, selected topics in international monetary policy.</p>
570,571	<p>ECONOMIC DEVELOPMENT AND GROWTH 570: Determinants of economic development, development planning models, and conflicts between development objectives. 571: Applications of economic development theory to concrete situations at the national, sectoral, and regional levels. Empirical case studies. Choice of technique in development.</p>
585	<p>COMPARATIVE ECONOMIC SYSTEMS Theories, structure, policies, and performance of the contemporary economic systems of the Soviet Union, China, Yugoslavia, United States, and France; emphasis on the theoretical and operational dimensions of central planning under command and market socialism; study of the relation between theory and practice and between object and instruments in each system.</p>

Course
Number

Title and Content

696

THEORY OF QUANTITATIVE ECONOMIC POLICY

- 696A: Formulation and specification of policy models applied to problems of economic stabilization and economic development, mainly at the national level. Economic forecasting and reliability analysis for economic policy models.
- 696B: Economic policy models and the theory of optimal control. Specification and computation of optimum policy in dynamic economic models. Certainty equivalence theorem and decision rules. Continuous and discrete versions of the maximum principle and their economic applications to growth, stabilization, and other problems.
- 696C: Economic policy models at the sectoral level. Sectoral planning applied to agriculture, transportation, education, and other sectors. Changes in technology and their effects on sectoral objectives.