PD/A CRSP Seventeenth Annual Technical Report

# Economic and Social Returns to Technology and Investment in Thailand

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## Abstract

A survey will be conducted in northeastern Thailand to measure rates of adoption of CRSP-developed technologies. The rates of adoption will be used in a quantitative model to measure the internal rate of return to investment in aquaculture research in Thailand. This project follows work of the Eighth Work Plan that measured these returns to research for CRSP shrimp research in Honduras. Funding for this project was available as of July 1999.

## Introduction

The Pond Dynamics/Aquaculture CRSP is a global research activity directed toward improving the reliability and efficiency of pond aquaculture production. The ultimate benefit of this effort will be the economic and social returns that represent the impact from farmers adopting new technologies developed by the PD/A CRSP.

Technical progress has been modeled as a lagged function of research expenditures (Chavas and Cox, 1992). This study identified and measured the length of time required to fully translate public research expenditures into economic benefits and estimated internal rates of return for research expenditures. In the Chavas and Cox model, there were no restrictions on substitution possibilities among inputs, joint estimation of the production technology, technical change, and the effects of research on technical progress using very disaggregate inputs. This approach required only a standard linear programming algorithm. Ayer and Schur (1972), Ardito-Barletta (1971), and others estimated social rates of return to the investment in public research.

Fischer et al. (1996) used a random-effects model within a Bayesian framework to analyze the effect of adoption of new wheat varieties in South Australia. Results showed that not all pieces of information added equally to knowledge about the innovation. It further showed that the acquisition of information was much slower than had been suggested by previous Bayesian models and could also explain laggards and partial adoption. Huang and Sexton (1996) developed a general imperfect competition model to evaluate returns to a cost-reducing innovation. In an imperfectly competitive market structure, this study showed that farmers' incentives to adopt a mechanical harvester for tomatoes in Taiwan were attenuated because the benefits were reduced by oligopsony power of processors.

Fuglie (1995) developed a multimarket model to explore equity and efficiency implications of improving crop storage technologies. The rate of return to research on potato storage in Tunisia was estimated to be between 44 and 75%.

Dasgupta and Engle (2000) utilized nonparametric estimation techniques to estimate returns to the PD/A CRSP investment in shrimp research in Honduras to be from 18 to 45% for the combined public and private research investment.

## Methods and Materials

This project began in the month that this report was written. To date, the authors have reviewed all PD/A CRSP reports on research conducted in Thailand and have compiled a list of the most important technological advances emanating from the CRSP-funded research initiatives. This list of technologies has been circulated to investigators who have been actively involved in the PD/A CRSP Thailand research program for ranking. When the most important technologies have been selected, the survey instrument will be developed, pre-tested in Thailand and the survey implemented. Final decisions on the form of the analytical model used will be based, in part, on the response rate and the number of usable observations obtained from the survey.

## Anticipated Benefits

Results of this study will be useful for the PD/A CRSP to justify continued funding by quantifying benefits and impacts of the research effort. This study will provide the first estimates of the global social and economic returns generated by the PD/A CRSP. The results of this project will document the contribution that the PD/A CRSP research has made and will continue to make over time in both social and economic terms. This is essential to justify continued funding for the CRSP in the US and for host country support.

## Literature Cited

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