

JCU ePrints

This file is part of the following reference:

Le Anh, Tuan (2009) *Socio-economic constraints to rice farmers' adoption of the community trap barrier system for controlling rodents in rice-based farming systems in the Mekong Delta, Vietnam.* Masters (Research) thesis, James Cook University.

Access to this file is available from:

<http://eprints.jcu.edu.au/14973>



**SOCIO-ECONOMIC CONSTRAINTS
TO RICE FARMERS' ADOPTION OF THE COMMUNITY
TRAP BARRIER SYSTEM FOR CONTROLLING RODENTS
IN RICE-BASED FARMING SYSTEMS
IN THE MEKONG DELTA, VIETNAM**

Thesis submitted by

LE ANH TUAN

for the degree of Master of Science (Research)
in the School of Earth and Environmental Sciences,
James Cook University

Supervisors:

Dr. Alison Cottrell (JCU), Associate Professor David King (JCU)

Dr. Peter Roebeling (CSIRO), Dr. Ken Aplin (CSIRO)

STATEMENT OF ACCESS

I, the undersigned, author of this work, understand that James Cook University will make this thesis available for use within the University Library and, via the Australian Digital Theses network, for use elsewhere.

I understand that, as an unpublished work, a thesis has significant protection under the Copyright Act and; I do not wish to place any further restriction on access to this work.

March 8, 2009

Signature

Date

STATEMENT OF THE CONTRIBUTION OF OTHERS

This masters research was conducted under the primary supervision of Dr. Alison Cottrell and Associate Professor David King at the School of Earth and Environmental Sciences. Supervision was also provided by two scientists from Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO) - Dr. Peter Roebeling (from March to August 2007) and Dr. Ken Aplin (from August 2007 to February 2009).

The project under this study was made possible thanks to the financial support from the John Allwright Fellowship of the Australian Centre for International Agricultural Research.

Financial support for technical trainings in Australia and field works in Vietnam were partially provided by Australian Centre for International Agricultural Research, the Sustainable Ecosystems of the Australia's Commonwealth Scientific and Industrial Research Organisation, and the School of Earth and Environmental Sciences at James Cook University.

March 8, 2009

Signature

Date

DECLARATION OF ETHICS

The research presented and reported in this thesis was conducted within the guidelines for research ethics outlined in the *National Statement on Ethics Conduct in Research Involving Human* (1999), the *Joint NHMRC/AVCC Statement and Guidelines on Research Practice* (1997), the *James Cook University Policy on Experimentation Ethics. Standard Practices and Guidelines* (2001), and the *James Cook University Statement and Guidelines on Research Practice* (2001).

The proposed research methodology received clearance from the James Cook University Human Research Ethics Review Committee (approval number H-2708).

STATEMENT OF SOURCES DECLARATION

I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

March 8, 2009

Signature

Date

Dedication

This thesis is dedicated to my grandmother, and is in memory of my father.

They both taught me the value of hard work, patience and love.

Acknowledgements

This study would not have been possible without the fellowship granted by the Australian Centre for International Agricultural Research (ACIAR). I wish to sincerely thank Dr. John Skerritt, Deputy Chief Executive Officer of ACIAR, who encouraged and supported my study, from the application stage of the fellowship. I wish to thank Dr. Simon Hearn for his suggestions and support at the application and proposal development stage of my project, and Ms. Sharon Harvey for her kind help and support during my two-year program.

My academic supervisors are very much instrumental to the quality and the progress of this thesis. I wish to express my gratitude and sincere thanks to Dr. Alison Cottrell and Associate Professor David King for their encouragement, support, guidance, patience, understanding and hospitality throughout different stages of my thesis. Their suggestions and advice sparked new ideas for the thesis, which enabled my expanded thinking and further reading for exploration of new knowledge. Their steady and consistent support, suggestions and their strong belief in my capability, kept my project going and completed ahead of time. To the academic committee members, Associate Professor Peter Valentine and Dr. Simon Robson, my sincere thanks for all of your advice and support.

My thanks are due to Dr. Peter Roebeling (formerly Project Coordinator with CSIRO), Dr. Peter Brown and Dr. Ken Aplin (CSIRO) for their kind help and support in many ways – review of chapters and papers, providing financial support to my two field trips, training in Australia and their hospitality. I wish to thank and acknowledge the help and support from Dr. Grant Singleton, Dr. K.L Heong and Dr. Florencia Palis from the International Rice Research Institute, and Professor Monina Escalada from Leyte State University for their encouragement and support at the application stage for the fellowship and their help after that with advice, and suggestions, review of chapters, papers, and provision of data and books.

I thank Dr. Nguyen Huu Huan from the Department of Plant Protection of the Ministry of Agriculture and Rural Development, Mr. Nguyen Huu An from An Giang Department of Plant Protection for their support during my two field trips. My thanks go to Dang Thanh Phong, Nguyen Van Hiep of the An Giang Protection Department, their staff and local collaborators who made my data collection in An Giang a great success.

The farmers and staff from local governments were very friendly and hospitable. Their openness furthers my understanding of the local rice farming practices and their daily life as a rice farmer in the Mekong delta of Vietnam. I wish to acknowledge all for their kind help and support.

I wish to thank my friends – especially those who helped and supported me in different ways of my studies in Australia. Your friendliness, help and hospitality helped me learn more about your countries, and made my study in Australia an enjoyable and unforgettable experience.

My gratitude goes to my beloved wife and daughter. Their support, thoughts, patience and understanding have always helped maintain my efforts and endurance. You have made this project a success.

Thank you very much.

Abstract

In the Mekong delta region, rodents are one of the major pests that rice farmers need to control regularly using physical and chemical methods. Chemical methods are more commonly used because they are convenient. The Community Trap Barriers System (CTBS) is a new environmentally-friendly, physical rodent control method. Despite being introduced to farmers, the adoption has been slow because the technology requires collective adoption to overcome cost constraints. In this study, collective use of this method was found to be challenging because of two main reasons. First, farmers found it difficult to manage the trap barrier system as a common pool resource. Second, collective use at the field level is constrained by the difficulties to obtain consensus among farmers in the adoption area. Current levels of social capital, the source of collective action, at the field level were found to be in decline when compared with those in the past. The decline is attributed to the changes in relationships between farmers at the field level. Farmers are unable to maintain their traditional networks which were grounded on kin, neighbour, and friendship relations. In addition, social and economic development has improved rural lifestyles but this has resulted in a lack of need for the social capital represented by those traditional relationships, especially for the rice farming practice. The adoption of the CTBS, as well as other collective based technologies will be challenging unless there are efforts to improve social capital at the field level. This may well be best achieved at the local government level because farmers have a strong reliance on the government to facilitate the social capital generation process.

Table of Contents

Title	i
Statement of access	ii
Statement of the contribution of others	iii
Declaration of ethics	iv
Statement of sources declaration.....	v
Dedication	vi
Acknowledgements	vii
Abstract	ix
Table of content	x
List of figures	xiii
List of tables.....	xiv
List of charts.....	xv
Chapter 1 – Introduction	1
1.1 Overview of demographic characteristics and rice production in Vietnam and the Mekong Delta	1
1.2 Rodents – rice pest and control practices.....	2
Chapter 2 – Theoretical Foundations for the Research	9
2.1 Purpose of Literature Review	9
2.2 Review of Literature	9
2.2.1 Diffusion of Innovation	9
2.2.2 Social Capital	28
2.2.3 Common Property Resources	42
2.3 Summary and Justification for Theoretical Framework	57
Chapter 3 – Methodology	60
3.1 Research goal and method selection.....	60
3.1.1 Research goal and research questions	60
3.1.2 Selection of study site.....	60
3.1.3 Selection of research methods	61
3.1.4 Research participants.....	67
3.2 Data collection	68
3.2.1 Data sources	68
3.2.2 Sampling.....	68
3.2.3 Data collection instruments	70
3.3 Management of data	71
3.3.1 Note-taking and processing	71

3.3.2 Bias.....	72
3.3.3 Validity/Trustworthiness and Reliability	72
3.4 Data analysis.....	74
3.4.1 Quantitative data.....	75
3.4.2 Qualitative data.....	75
3.4.3 Causal explanation in qualitative research	75
3.4.4 Generalisability in qualitative research	76
Chapter 4 – Background to Adoption of the CTBS – the History of Rice Farming in the Mekong, the Profile Rice Farming in An Giang and Farmers’ Initial Perceptions of the CTBS	77
4.1 Overview of rice farming in the Mekong delta and An Giang province	77
4.1.1 Socio-economic background of rice farmers in the Mekong - an historical review.	77
4.1.2 Farmers’ profile and characteristics of rice cultivation practice in An Giang.....	88
4.2 CTBS constraints in An Giang	96
4.2.1 Relative Advantage	98
4.2.2 Complexity & Compatibility (Factors that influence farmers’ attitude towards adoption of the technology during the persuasion stage)	99
4.3 Comparisons with previous studies	104
4.4 Conclusion	107
Chapter 5 – Farmers’ Perceptions of Rodents as a Pest, and the Methods of Control.....	108
5.1 Background.....	109
5.2 Rodent pest severity and CTBS adoption likelihood (Research question no.1)	117
5.3 Availability of subsidy and CTBS adoption likelihood (Research question no.2)	120
5.4 Knowledge, attitude and practices of farmers about non-chemical rodent control and CTBS adoption likelihood (Research question no.3)	121
5.5 Conclusion	123
Chapter 6 – Existing Social Capital	124
6.1 Household level	127
6.1.1 Rodent control practices	127
6.1.2 Communication channels	127
6.1.3 Farmers’ confidence:.....	128
6.1.4 Labour availability	129
6.1.5 Production inputs and equipment	129
6.1.6 Capital for agricultural inputs.....	129
Summary	130
6.2 Group level	130

6.2.1 Communication channels and its relations with farmers' ability to make daily decision.....	130
6.2.2 Sources of information that are related to farmers' rodent knowledge	131
6.2.3 Kinship	133
6.2.4 Associational involvement/membership	134
6.2.5 Norms of reciprocity	136
6.2.6 Social Trust.....	137
6.2.7 Trust among Farmers.....	139
6.2.8 Trust in government	141
6.2.9 Networks of communication	142
6.2.10 Consensus building.....	143
6.2.11 Social cohesion and factors that may influence its formation	144
6.2.12 History	145
Summary	146
6.3 Conclusion	147
Chapter 7 – Local Capacity for Institutional Arrangements	149
7.1 Examination of variables that affect the outcome of CTBS management.....	151
7.2 Causal explanation.....	155
7.3 Conclusion	158
Chapter 8 – Conclusion.....	161
8.1 Main constraints to the adoption of the CTBS and summary of answers to the research questions	161
8.2 Policy implications	166
8.3 Limitations and future research	168
8.4 Conclusion	172
References Cited	174
Bibliography.....	192
Appendices.....	200
Appendix A - Interview Guide (for Focus Group Discussions)	201
Appendix B - Survey (for farmers directly managing CTBS experiments).....	205
Appendix C - Knowledge, Attitudes and Practices & Socio-Economic Survey.....	209
Appendix D - Correlations Matrix	230
Appendix E - Independent variables associated with Rating of Social Unity	233
Appendix F - Timelines of events that influenced collective rice production in Mekong ..	235
Appendix G - Field trip schedule.....	239

List of Figures

Figure 1 - Map of An Giang province.....	2
Figure 2 - Placement of a Community Trap Barrier System.....	5
Figure 3 - Halo effect of combined CTBS	6
Figure 4 - A model of five stages in the Innovation-Decision Process	19
Figure 5 - The Forms and Scope of Social Capital	35
Figure 6 - Forms of Social Capital, Trust, and their Linkages to Achieving Collective Action	36
Figure 7 - Linkages between choices and level of analysis	46
Figure 8 - Framework for analyzing the Commons	47
Figure 9 - Schematic causal model showing typical relationship among variable types	54
Figure 10 - Theoretical Framework for the Research	59
Figure 11 - Focus of qualitative research as posited in the diffusion of innovation framework	97
Figure 12 - Schematic causal model postulating ways that cost of monitoring and enforcement mediate between characteristics of resources and resources users and outcomes of resource management institutions	150
Figure 13 - Schematic causal model showing typical relationship among variable types	157
Figure 14 - Model for future research	171

List of Tables

Table 1 - Profile of participating farmers from Tinh Bien and Tri Ton.....	88
Table 2 - Basic profile of farmers in the study sites (n=223).....	89
Table 3 - Landholding distribution (n=226).....	90
Table 4 - Typical time allocation for agricultural activities (n=268).....	91
Table 5 - Sources of capital used for agricultural inputs for rice production.....	93
Table 6 - Rice Cropping Pattern in 2006	94
Table 7 - Total irrigated rice areas (ha) by seasons and by sources.....	95
Table 8 - Total irrigated rice areas (ha) by irrigation sources	95
Table 9 - Rice yield by cropping season (in hectare).....	96
Table 10 - Rice yields (by season and yield level).....	96
Table 11 - Test scores on rodent management knowledge (by range).....	122
Table 12 - Sources of information that farmers tend to use for daily agricultural update	128
Table 13 - Odds ratio (kin/non-kin)	133

List of Charts

Chart 1 - Labour distribution - 2006 Summer-Autumn season (Family vs. Hired Labour).....	92
Chart 2 - Date of sowing in the first month of Summer-Autumn season (n = 229).....	94
Chart 3 - Important pests associated with rice crops (n=221).....	109
Chart 4 - Rat outbreak as recalled by farmers over years (% of respondents agreeing)	110
Chart 5 - Reasons for high rodent abundance (agreed by percentage of farmers)	110
Chart 6 - Reasons why rat control is important (n=222).....	111
Chart 7 - Are rodents controllable? (n=222).....	112
Chart 8 - Why rodents are difficult to control (n = 217).....	112
Chart 9 - Differences in timing for rodent management (n = 217)	113
Chart 10 - Does rodent control contribute to maintaining rice yield?.....	113
Chart 11 - Is chemical rodenticide safe for humans, animals and the environment? (n = 222)	114
Chart 12 - Control priorities (Winter-Spring and Summer-Autumn seasons 2005-06)	115
Chart 13 - Estimated rice loss because of rodents (n = 117).....	115
Chart 14 - Current control methods - individual vs. group use (n=223).....	116
Chart 15 - Organisers for collective rodent control (n=222).....	117
Chart 16 - Associational Life via Local Meetings in 2006	134
Chart 17 - Voluntary works by type of works (n=191).....	135