
DEVELOPMENT ECONOMICS AND POLICY

Series edited by Joachim von Braun, Ulrike Grote and Manfred Zeller

76

Impact of Technological Innovation on the Poor

Integrated Aquaculture-Agriculture
in Bangladesh

Abu Hayat Md. Saiful Islam

Table of Contents

Table of Contents	V
List of Tables	IX
List of Figures.....	XI
List of Abbreviations.....	XIII
Acknowledgements	XV
Chapter 1: Introduction.....	1
1.1 Background.....	1
1.2 Problem Statement.....	2
1.3 Research Objectives and Questions.....	5
1.4 Conceptual Framework.....	6
1.5 Research Methods.....	8
1.5.1 Study Area.....	8
1.5.2 Data: Sampling Technique, Sample Size, and Survey Effort.....	10
1.5.3 Indigenous People of Bangladesh	12
1.6 Outline of the Dissertation	13
Chapter 2: Performance of Integrated Aquaculture-Agriculture Value Chain Development in Bangladesh	15
2.1 Introduction.....	15
2.2 Methods.....	17
2.2.1 Data.....	17
2.2.2 Analytical Methods.....	18
2.2.2.1 Value-chain analysis.....	18
2.2.2.2 Gross margin analysis.....	20
2.2.2.3 Partial budgeting analysis	21
2.2.2.4 SWOT analysis.....	21

2.3 Results and Discussion.....	22
2.3.1 Value Chain Mapping.....	22
2.3.2 Actors, Value Addition, Governance, Institutional Framework and Employment in Rice–fish based Integrated Aquaculture–agriculture Value Chains.....	24
2.3.3 Gross Margin Analysis of Value Chain Actors.....	28
2.3.4 Partial Budgeting.....	32
2.3.5 SWOT Analysis of Integrated Rice–fish Value Chains	33
2.3.5.1 Strengths.....	36
2.3.5.2 Weaknesses.....	37
2.3.5.3 Opportunities	38
2.3.5.4 Threats	40
2.4 Conclusions and Policy Implications	42
Chapter 3: Integrated Aquaculture-Agriculture Value Chain Participation Dynamics in Bangladesh.....	45
3.1 Introduction.....	45
3.2 Integrated Aquaculture-Agriculture Value Chain Participation Dynamics: Issues and Approaches.....	48
3.2.1 Integrated Aquaculture-Agriculture in Bangladesh.....	48
3.2.2 Integrated Aquaculture-Agriculture Adoption Research Issues.....	49
3.3 Empirical Econometric Estimation Framework.....	50
3.3.1 Conceptual Framework for Integrated Aquaculture-Agriculture Value Chain Participation.....	50
3.3.1.1 Multinomial logit model	52
3.3.1.2 Random Effects logit model.....	53
3.3.1.3 Re-specified Random Effects logit model for addressing endogeneity	53
3.3.1.4 Correlated Random Effects model.....	54
3.4 Data and Descriptive Statistics.....	54
3.5 Econometric Results.....	58
3.5.1 Multinomial Logit Model Results	58
3.5.2 Random Effects Logit Model Results	60

3.6 Conclusions and Policy Implications	63
Chapter 4: Welfare Impacts of Integrated Aquaculture-Agriculture Value Chain Participation Dynamics in Bangladesh	67
4.1 Introduction.....	67
4.2 Framework of the Study.....	70
4.3 Literature Review	71
4.4 Data and Descriptive Statistics.....	73
4.4.1 Who Participated in Integrated Aquaculture-Agriculture Value Chains in Bangladesh?.....	73
4.4.2 Relationships between Integrated Aquaculture-Agriculture Value Chain Participation Dynamics and Household Welfare.....	75
4.4.3 Distributional Impacts of Integrated Aquaculture-Agriculture Value Chain Participation	76
4.5 Estimation Issues and Strategy.....	77
4.6 Results.....	81
4.6.1 Integrated Aquaculture-Agriculture Value Chain Participation Dynamics and Household Welfare	81
4.6.1.1 Naive Pooled Ordinary Least Squares and Random Effects model results	81
4.6.1.2 Standard Fixed Effects model results.....	83
4.6.1.3 Heckit panel and control function approach results	85
4.6.2 Who Benefits More From Integrated Aquaculture-Agriculture Value Chain Participation?	86
4.7 Conclusions	87
Chapter 5: Comparative Socio-environmental Impacts of Rice–Fish Based Integrated Aquaculture-Agriculture and Rice Monoculture in Bangladesh	91
5.1 Introduction.....	91
5.2 Methods.....	94
5.2.1 Data.....	94

5.2.2 Econometric framework	95
5.2.3 Dependent Variables: Farmer Socio-Environmental Awareness Index.....	98
5.2.4 Independent Variables.....	98
5.3 Results and Discussion.....	100
5.3.1 Plot Level Comparison of Inputs Used for Rice–fish based Integrated Aquaculture-Agriculture and Rice Monoculture Farming Systems	100
5.3.2 Comparison of Farmer Perceptions	105
5.3.2.1 Rice–fish based IAA farmer perceptions of the socio-environmental impacts of rice monoculture and integrated rice–fish systems	105
5.3.2.2 Comparison of perceptions of the socio-environmental impacts of rice monoculture among integrated rice–fish farmers and rice monoculture farmers	108
5.3.3 Determinants of Farmer Awareness of the Socio-environmental Impacts of Rice Monoculture: Tobit and PSM Analyses.....	110
5.4 Conclusions and Policy Implications	112
Chapter 6: Summary, Conclusion—Policy Implications and Further Research Needs	117
6.1 Research Summary	117
6.2 Conclusions and Policy Implications	123
6.3 Further Research Needs.....	125
References.....	127
Appendix.....	161
Abstract	195
Zusammenfassung.....	197