

**CAN CONTRACT FARMING OF CASSAVA  
CONTRIBUTE TO AMELIORATION OF CLIMATE  
CHANGE IN THAILAND?**

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## **DECLARATION**

I certify that the substance of this thesis has not already been submitted for any degree and is not currently submitted for any other degree.

I certify that, to the best of my knowledge, any help received in preparing this thesis and all sources used have been acknowledged.

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## **ABSTRACT**

There are four main objectives for success in reducing the problems from climate change by increasing the concern with a better understanding of more effective policies for sustainable development of ethanol production by cassava as an alternative energy source in Thailand.

The first objective is to examine the agri-business systems of cassava production for producing ethanol as an alternative energy source and to identify types of smallholders who might decide to become involved in contract farming for cassava production. Participation in contracts under agricultural cooperatives in cassava production is based on verbal agreement between farmers and agricultural cooperatives and a written contractual agreement between agricultural cooperatives and ethanol processors. Four categories of smallholders were identified based on ownership of land and assets.

The second objective is to evaluate the factors affecting contract farming. Results of examination using Linear Probability, Probit and Logit models show human capital, physical assets, production costs, credit access and agricultural groups are important factors in participation in contracts. Most wealthy smallholders face high transaction costs and hence they are willing to participate in contracting. However, lower-income smallholders, who also faced high transaction costs, were not interested in participation in contract farming. This might be because most of them were older and had lower levels of education. Thus, they might have difficulties adapting to contracting.

The third and fourth objectives are to evaluate the effects of contract participation on outcomes. In terms of Propensity Score Matching method, contract farming can reduce the total costs of cassava production and increase incomes, farm gross margins, and employment. Contract farming is also a variable strongly and significantly influencing cassava incomes, farm gross margins, and non-family labour using Instrumental Variables with 2SLS and OLS estimates. However, contract farming is an important factor affecting lower cost of cassava production using OLS estimate. The costs of cassava-based ethanol production could be reduced by contract farming; thus, the price of gasohol is likely to be decreased and could be competitive with fossil fuel. Hence, in the long-term, the existence of contracting may exacerbate income inequality in rural areas and can be used as a strategy to improve the standards of living when there is underemployment that often occurs in the transition from subsistence to modern commercial farming.

## ABBREVIATIONS

ACACIA	A Concerted Action towards a Comprehensive Climate Impacts and Adaptations
AEDP	Alternative Energy Development Plan
ATE	average treatment effect
BAAC	Bank for Agriculture and Agricultural Cooperatives
BMA	Bangkok Metropolitan Administration
BOI	Board of Investment
CF	Contract Farming
CP	Charoen Pokphand
CNG	Compressed Natural Gas
DMF	Department of Mineral Fuels
EEA	European Environment Agency
EEDP	Energy Efficiency Development Plan
EU	European Union
FAO	Food and Agriculture Organization
FFV	flex-fuel vehicles
GCP	Gross Cell Product
GDP	Gross Domestic Product
GHG	greenhouse gas
HQCF	High Quality Cassava Flour
HVF	High Value Food
IFAD	International Fund for Agricultural Development
ITCZ	Inter Tropical Convergence Zone
IV	Instrumental Variable
KBM	Kenel-based Method
KU	Kasetsart University
LPM	Linear Probability Model
LPG	Liquid Petroleum Gas
Mcf	million cubic feet per day
MLE	Maximum Likelihood Estimation
MNRE	Ministry of Natural Resources and Environment
MOAC	Ministry of Agriculture and Cooperatives
MTJDA	Malaysia-Thailand Joint Area
MVP	Marginal Value Product
NEPC	National Energy Policy Committee
NETTA	North-eastern Tapioca Trade Association
NNM	Nearest Neighbour Method
OAE	Office of Agricultural Economics of Thailand
OSCC	Office of Climate Change Coordination
OLS	Ordinary Least Squares
ONEP	Office of Natural Resources and Environmental Policy and Planning
OR	Odds Ratio
PSM	Propensity Score Matching
PTTEP	PTT Exploration and Production Public Company Limited
RAY-FCR	Rayong Field Crops Research Centre
SSF	Simultaneous Saccharification Fermentation
toe	tonne of oil equivalent
TTDI	Thai Tapioca Development Institute
TTPFA	Thai Tapioca Products Factory Association
TTSA	Thai Tapioca Starch Association
TTTA	Thai Tapioca Trade Association
UNFCCC	United Nations Framework Convention on Climate Change
VHG	Very High Gravity

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