

**MOTIVATION OF FARMERS ON THE THIRD RICE CROP TRANSFORMATION  
IN THE CONTEXT OF CHANGE OF NATURAL AND SOCIO-ECONOMIC  
CHARACTERISTICS – CASE STUDY IN AN GIANG  
PROVINCE – MEKONG DELTA - VIETNAM**

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**ABSTRACT**

*The cultivation of the third rice crop in an Giang province located within Mekong delta associated with the construction of dykes in flood season on the one hand increases rice production, but on the other hand causes the negative impacts on environment and economics to farmers. This research analyses the farmer's perception on the impacts of the changes of natural and socio-economic characteristics to rice farming, advantages and disadvantages of the third rice crop cultivation, and motivation of farmers to the plant transformation in the coming years. This quantitative study used the structured questionnaire to collect information of 834 farmers in 9 districts of An Giang province situated in the upperstream of Cuu Long River. The research findings suggest the functional agencies should have a proper strategy and land use planning for crop in flood season and pay attention to support livelihood's transformation of rice farmers as well.*

**KEYWORDS:** *The Third Rice Crop, Flood Season, Risk Perception, Changes of Natural and Socio-Economic Factors, Motivation of Plant Transformation*

**Received:** Apr 18, 2016; **Accepted:** Apr 29, 2016; **Published:** May 03, 2016; **Paper Id.:** IJEEFUSJUN20162

**INTRODUCTION**

Mekong Delta located in the lower area of Mekong River and is considered as the center of the agricultural production and aquaculture of Vietnam. In which, rice only has accounted for 54 percent of cultivated area, 56 percent of national production and 90 percent of the country export (Viet Nam statistical year book, 2014). There are two main rice crops in this delta: the first is a Winter-Spring rice crop planted from October till April next year; the second is a Summer-Autumn rice crop planted from April till July. In addition, farmers also plant the third crop (or Autumn-Winter rice crop) from July till October, mostly in provinces located in the flood prone areas such as An Giang and Dong Thap provinces.

The rice experts have warnings to the third rice crop because it may cause many environmental challenges and economic risks. First of all, it is planted in flood season and it requires dike system. Dykes impede alluvia flow into the fields, decrease soil fertility and prevent the cleaning of fields through removing redundant fertilizer. They also impede water flows on the field, bring more flooding in other areas and cause deeper salinity intrusion in coastal provinces of Cuu Long River as well. Secondly, the pest pressure in the third rice crop is higher than the first and second ones because the empty land in the short time (approximately one month) creates favorable condition for pest invasion. Consequently, farmers use more pesticide for plant protection. Thirdly,

about economic benefits, at this time because of rain (range 50 to 60 days), yield of the third rice crop is lower than the first crop. To carry out this crop, farmers have to pay more costs for land reclamation, water pumping out, dike reinforcement, etc. In terms of the sale, although rice is the main agricultural product that is solely supplied by the government but raw rice price remained under the pressure of market competition with rice export countries such as Thailand. When the competition of international market happens, domestic enterprises limit their rice-stock due to price fluctuation and it would affect to farmers.

Therefore, incentive policy to the third rice crop is not high evaluated in terms of economic efficiency as well as protection of natural ecological environment (Coclanis & Stewart, 2011b; “Mekong Delta Plan”, 2013). Besides, the functional agencies have advised farmers to change their crop (such as switching from rice-monoculture to fish-farming) or the third crop should be only planted in the suitable conditions (eg. adequate ability to control flood or pest). For the rice farmers, however, plant transformation is not easy and it depends on many factors (such as capital, technology, market, etc.). Farmers with less land and ability for plant transformation; the third rice crop is the only way to increase their income.

The research question is about farmers’ perception on advantages and disadvantages of the third rice crop in comparison to the first and second rice crops. And in the context of changing of natural and socio-economic characteristics, whether or not farmers pay intention of plant transformation? The research group’s literature review showed most of researches did not mention on farmers’ perception and motivation of the plant transformation in Mekong delta. Therefore, this study aims to fill the gap as well as provides the useful information to the agriculture and rural development agency in developing the solutions for improving farmers’ livelihood and supporting to the rural environmental protection.

## **RESEARCH METHODOLOGY**

This paper is a part of the study “Capability of rice farmers in An Giang in the context of Climate Change and impact of dams’ upstream Mekong River” carried out by the Center of Water Management and Climate Change (WACC) of Vietnam National University, Ho Chi Minh City. This is a descriptive and correlation study and data was collected by social survey. The structured questionnaire was done on 834 rice farmers in 9 districts of An Giang province. And the main parts of questionnaire include: farmers’ perception on changes of natural and socioeconomic characteristics on their farming during the past five years, the advantages and disadvantages of the third rice crop in comparison to other crops and their motivation of plant transformation. The data collected by questionnaire was entered and processed with SPSS version 16.0. The descriptive statistic and Chi-square test were applied for data analysis.

## **DISCUSSIONS RESULTS**

Farmers involving in this research had an average age of 50 years old. Their average family size was about 5 persons and average number of labour was 2 labors per household. Farmers with more than 2 livelihoods accounted for 55.2 percent and average income per capita was 2.6 USD/day. Farmers’ household with average income below 1 USD/day/person occupied 12.9 percent of total household. Concerning the production of the third rise crop, three-quarter of farmers cultivated the third rice crop. Farmers owned their land were 87.4 percent. Their average years of farming were 10 years. The cultivation land per capita was 0.39 hectare in average. There were only 16.2 percent of farmers having the agriculture machinery. The average yield of the third rice crop reported by farmers was 900 kg/1000m<sup>2</sup>, lower than their first crop (1,069 kg/1000 m<sup>2</sup>) and higher than their second crop (809 kg/1000 m<sup>2</sup>).

## PERCEPTION OF RICE FARMERS

### Impact of Change of Natural Characteristic to Rice Farming

Climate change is a global problem and Mekong Delta was ranked one of the most vulnerable areas in terms of both natural ecological environment and the lives of local people. The climate risks include the sea level rise, flooding in upstream, drought and saline intrusion at the estuary (Käkönen, 2008). At the upstream of Mekong Delta, An Giang and Dong Thap are two provinces bordered Cambodia, where Mekong River flows into Vietnam and divides into two branches namely Tien River and Hau River. The natural condition here is the flood prone area in rainy season; and water resources, irrigation of the region throughout the year are always plentiful. In recent years, however, climate changes have resulted in more droughts, hot sunny and the phenomena of erosion of embankments in some areas (Coclanis & Stewart, 2011a). The previous studies also forecasted Mekong Delta in the near future would be affected by drought due to change of hydrological regime of Mekong River once many hydroelectric dams and reservoirs built and put into operation in the countries located in upstream and middlestream (such as China and Laos) (Unverricht et al., 2013). Therefore, changes of climate will become more complex, unpredictable and severe impact on farming activities, especially rice.

In this study, majority of farmers reported that change of amount of flood water and increase of drought caused by climate change and economic activities in upstream have not affected their farming yet (53.8% and 51.7%, respectively). On contrary, 48.2% farmers said that decrease of alluvial have impacted to their farming but not serious. Less than 10% of remaining farmers stated that those negative changes of natural factors have impacted seriously to their farming (See Table 1).

**Table 1: Percentage Distribution of Farmers' Perception on the Impact of Changes of Natural Factors to Rice Farming**

Degree of Impact to Rice Farming	Change of Natural Factors		
	Changing of Amount of Flood Water (%)	Decreasing Alluvia (%)	Increasing Drought (%)
Have no impact	53.8	41.6	51.7
Have impact and not serious	41.1	48.2	40.9
Have impact and serious	5.0	10.2	7.4
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Source: WACC (2015)

In addition, it should be noted that inundation caused by heavy flood and rain resulted in spoiled tree, early harvest, Rice yield decrease, crop failure, more insect and lower profit.

### Impact of Change of Socio-Economic Characteristic to Rice Farming

Mekong Delta's granary always attains the highest production in Vietnam, especially An Giang province. The development of three rice crops policy was specially invested by government since the early twentieth century by constructing irrigation canals with all levels (including the second, third and interior levels) to led water into the fields far from the rivers (Käkönen, 2008; Renaud & Kuenzer, 2012). Currently, some areas are absolutely protected by full dykes such as Cho Moi and An Phu districts and therefore, the flood did not occur during the raining season and farmers can cultivate all year round.

Because of rice is the key plant of An Giang province, many policies for agricultural extension and credit has been developed here to support the production of farmers. Besides, the technological improvements in agricultural sector (eg.

new farming techniques, new rice varieties, and mechanisation) and the expansion of purchasing system to serve the rice export also make favorable conditions for the extension of rice farming.

In this study, farmers evaluated that the current socio-economic factors of rice farming had more advantages in comparison to the past five years. In which, factors of “Machinery”, “Purchasing system”, “Transportation system”, “Rice variety”, “Irrigation system”, “Farming technique” and “Agriculture inputs” had been increasingly developed and effectively supported to farming (93.5%, 85.7%, 85.2%, 84.1%, 80.6%, 80.0% và 77.0%, respectively) (See Table 2).

In contrast, hired labor was considered the most constraint factor to farmers. Under the impacts of industrialization and urbanization, young people in rural area have gone to cities for jobs or education and caused the decrease of labor in this area.

**Table 2: Percentage Distribution of Farmers’ Perception on the Current Technical and Socio-Economic Factorsof Rice Farming in Comparison to the Past Five Years**

Farmers’ Opinion	In-Come	Irriga-Tion	Transpor-Tation	Agri-Cultural Inputs	Farming Technique	Agri-Culture Extension Policy	Purcha-Sing System	Credits Policy	Rice Variety	Machi-Nery	Hired Labor
More advantage	64.9	80.6	85.2	77.0	80.0	50.4	85.7	57.6	84.1	93.5	41.2
The same	18.7	13.3	10.2	12.8	13.8	42.4	11.2	39.3	15.0	5.3	20.0
More difficult	16.4	6.1	4.6	10.2	6.2	7.2	3.1	3.1	0.9	1.2	38.8
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Source: WACC (2015)

### The Third Rice Crop

In general, majority of farmers said that socio-economic factors between the third rice crop and other crops are the same (such as income, irrigation, transportation, agriculture inputs, farming method, purchasing system, credit polcy, rice variety, machinery and hired labor). About one-third of farmers evaluated that factors of “Income” and “Purchasing system” had more advantage in the third rice crop. “Income” increases because farmers had more rice for selling and the price could be increased at this time (34.7 percent of farmers). “Purchasing system” was better as number of purchasing agents had been spreading and even the middlemen come directly to the field to buy rice (32.2 percent of farmers). In Mekong Delta, however, it should to note that income from rice is lower than income from other plants (such as vegetables). Therefore, rice farmers had to carry out the third crop to earn money for guarantee their life. Among the disadvantages of socio-economic factors of the third rice crop, “Hired labor” was ranked the most disadvantage one (28.2 percent of farmers), next to “Transportation” due to flooded street in flood season causes difficulties for farmers in transporting the agriculture inputs and harvesting rice (19.9 percent of farmers) (See Table 3).

**Table 3: Percentage Distribution of Farmers’ Perception on Advantages and Disadvantages of the Technical and Socio- Economic Factors of the Third Rice Crop Compared to Other Crops**

Farmers’ Opinion	In-Come	Irriga-tion	Transpor-tation	Agri-Cultural Inputs	Farming Technique	Agri-Culture Extension Policy	Purcha-Sing System	Credits Policy	Rice Variety	Machi-Nery	Hired Labor
More advantage	34.7	23.1	20.7	22.7	28.4	16.0	32.2	13.3	22.5	26.6	14.2
The same	45.6	60.3	69.4	68.9	62.8	73.2	63.4	77.8	73.9	67.5	57.6
More difficult	19.7	16.6	19.9	8.4	8.5	10.8	4.4	8.9	3.6	5.9	28.2
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Source: WACC (2015)

## MOTIVATION OF PLANT TRANSFORMATION

The result from survey showed two-third of farmers (65.4 percent) would continue to cultivate the third rice crop. According to interviewees, the most suitable farming for the third crop was rice (78.1 percent of farmers) and then was vegetables (12.9 percent of farmers). The rest farmers' thought were aquaculture or doing another work while waiting flood water gone down.

**Table 4: Percentage Distribution of Farmers' Opinions about the Third Rice Crop and Plant Transformation**

Farmers' Opinion	Continuing to do the Third Rice Crop	Interest of Plant Transformation	Intention of Implementing Plant Transformation
Have	65.4	44.8	30.6
Have no	34.6	55.2	69.4
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Source: WACC (2015)

Because of negative changes of flood water flow, alluvia and drought, 44.8 percent of farmers were interested in plant transformation and 30.6 percent of farmers had intended to carry out it in the coming time. (See Table 4)

The Chi-square test indicated there was the correlation between the farmers' perception on the changes of natural factors and their interest and intention to carry out the plant transformation in the coming time. Concretely, as follow:

- Rice farmers who evaluated the change of flood water flow had no impact to rice farming occupies the highest rate of opinion on "Have no interest of plant transformation" (61.2 percent of households) (P= 0.000, Chi-square value = 16.166) and highest rate of opinion on "Have no intention to carry out the plant transformation in the coming time" (74.8 percent of households) (P= 0.001, Chi-square value = 14.185).
- Rice farmers who evaluated the decreasing alluvia had no impact to rice farming occupies the highest rate of opinion on "Have no interest of plant transformation" (63.1 percent of households) (P= 0.000, Chi-square value = 15.260) and the highest rate of opinion on "Have no intention to carry out the plant transformation in the coming time" (76.1 percent of households) (P= 0.001, Chi-square value = 13.016).
- Rice farmers who evaluated the increasing drought had no impact to rice farming occupies the highest rate of opinion on "Have no interest of plant transformation" (63.6 percent of households) (P= 0.000, Chi-square value = 32.674) as well as the highest rate of opinion on "Have no intention to carry out the plant transformation in the coming time" (77.3 percent of households) (P= 0.000, Chi-square value = 31.341).

Interest of plant transformation was considered the premise for configuring the farmers' intention of implementing plant transformation. The results pointed out that rice farmers who are interested in plant transformation occupied the highest rate of intention of undertaking plant transformation in the coming time (97.6 percent) (P= 0.000, Chi-square value = 383.865) (See Table 5).

**Table 5: Percentage Distribution of Intention of Implementing Plant Transformation in the Coming Time by Interest of Plant Transformation**

Intention of Implementing Plant Transformation in Coming Time	Interest of Plant Transformation		Total
	Intention	No Intention	
Intention	n	449	579
	%	97.6	69.4

No intention	n	11	244	255
	%	2.4	65.2	30.6
<b>Total</b>	<b>n</b>	<b>460</b>	<b>374</b>	<b>834</b>
	<b>%</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Source: WACC (2015)

However, there was the gap between the interest and intention on plant transformation (44.8% compared to 30.6%, respectively). This was because of the configuring process of farmers' intention affected by their available resources. Concretely, in comparing farmers having interest but having no intention to implement the plant transformation with farmers having interest and also having an intention to implement the plant transformation, the analysis results showed that:

- Farmers having interest and also having an intention to implement the plant transformation had higher average income per capita per month than the other (116.484 USD compared to 87.341 USD, respectively) ( $P = 0.013$ )
- Farmers having interest and also having an intention to implement the plant transformation had larger cultivated land size per capita to the third crop than the other (1.4402 hectare compared to 1.3217 hectare, respectively)
- Farmers having interest and also having an intention to implement the plant transformation had higher mean number of labour than the other (2.49 labor, compared to 2.47 labor, respectively)

## CONCLUSIONS

- Cultivating the third rice crop associated with the dike system has caused many negative impacts on natural environment and economic risks to farmers.
- For rice farmers, what's happening are visible and bring economic benefits (such as increasing income for living improvement) are considered necessary. In contrast, the adaptation to the long-term changes (such as the changes of natural characteristics) may not be evaluated as priorities to be addressed. Therefore, majority of farmers in this research would continue to cultivate the third rice crop in the coming time. Furthermore, the advantages of socio-economic characteristics to rice farming seem to give them a belief in controlling the risks caused by this crop.
- Motivation of rice farmers on the plant transformation were configured not only from their perception on the risks resulted from the negative changes of natural characteristics, but also from their available resources (eg. income, land and labor) in carrying it out.

## SUGGESTION

With the macro vision, reducing the third crop also means to increase the regulation of water flow for the entire region. Besides, this enables to increase the land productivity, reduce pest and ensure the quality of grain. For these results, the functional agencies should have proper strategies and land use planning for flood season. The plant planning should be closed to the farmers' expectation as well as their ability. Since then, the proposed solutions are built not only to respond the current demands of reality but also to narrow the gap in decision-making with top-down approach (eg. the agriculture planning of functional agencies) and bottom-up approach (eg. farming intention of farmers). To have a complete view on this issue, it is necessary to conduct the future studies with more details in different geographical regions to find out the relationship between rice farmers' motivation and ability of the plant transformation as well as opinions of related actors

(including functional agencies, scientists and companies purchasing agricultural products) to this issue.

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In the context of change of natural and socio-economic characteristics " case study in an Giang. Province " mekong delta - vietnam. The cultivation of the third rice crop in an Giang province located within Mekong delta associated with the construction of dykes in flood season on the one hand increases rice production, but on the other hand causes the negative impacts on environment and economics to farmers. This research analyses the farmer's perception on the impacts of the changes of natural and socio-economic characteristics to rice farming, advantages and disadvantages of the third rice crop cultivation, and motivation of farmers to the plant transformation in the coming years. IN THE CONTEXT OF CHANGE OF NATURAL AND SOCIO-ECONOMIC CHARACTERISTICS CASE STUDY IN AN GIANG PROVINCE MEKONG DELTA - VIETNAM PHAM GIA TRAN & NGUYEN THI PHUONG CHAU Vietnam National University, University of Social Sciences and Humanities, Faculty of Geography, Ho Chi Minh City, Vietnam

**ABSTRACT** The cultivation of the third rice crop in an Giang province located within Mekong delta associated with the. And in the context of changing of natural and socio-economic characteristics, whether or not farmers pay intention of plant transformation? The Third Rice Crop In general, majority of farmers said that socio-economic factors Motivation of farmers on the third rice crop transformation in the context of change of natural and socio-economic characteristics " case study in an Giang province " mekong delta -vietnam. The cultivation of the third rice crop in an Giang province located within Mekong delta associated with the construction of dykes in flood season on the one hand increases rice production, but on the other hand causes the negative impacts more. The cultivation of the third rice crop in an Giang province located within Mekong delta associated with the construction of dykes in flood season on the one hand Because on-farm management of CGRs cannot be undertaken in a vacuum, farmers' diversification motivations and the effect of their working environment on the level of their contribution to crop diversity have to be understood for justified and efficient interventions. This will enable decision-makers to comprehend how policy (through different incentive mechanisms) can better influence farmers' variety management behavior. Many studies acknowledge that farmers play a key role in maintaining traditional varieties. Indeed, on-farm maintenance of CGRs is a positive externality of the farm activiti Climate change impacts on poor farmers in particular may involve thresholds that are so near current conditions that incremental adaptation actions may simply be ineffective in protecting assets, livelihoods and food security (Harvey et al., 2014; Savo et al., 2016). For example, across Africa, climate projections show that critical thresholds for several crops and regions may be crossed in the next 5-20 years, pushing farmers out of their current cropping choices and farming systems (Rippke et al., 2016). (2018) propose that transformation can be measured across three dimensions: the quality, distribution and timeframe of change.