

## Organic Rice Production and Consumption to Sustain Food Security in Oriental Mindoro, Philippines

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— *Review of* —  
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### ABSTRACT

The implementation of organic agriculture has brought many transformations in agricultural production. Better understanding the viability and value of agricultural development and its impact on food security need exploration of the potential of organic rice production from various aspects of determined efficiency. Information from 60 farmers was analyzed through stochastic frontier analysis (SFA), and data envelop analysis (DEA). The method used in farming and the occurrence of calamity measures the efficiency level of organic rice production per ecosystem. Findings of the study revealed that production is stable and constant; however, flooding affects efficiency, and more effort is needed to attain increasing return to scale in farming. Consumption is effectively self-governing on the farmers' prerogative on distribution and pricing. Thus, consumers' capability to purchase is limited. Results generate an adaptation of the Theory of Change as baseline data for planning, a guide for decision making, and future research undertakings.

Keywords: Consumption, food security, organic rice farmers, production.

### 1. INTRODUCTION

The dynamic difference in organic agriculture advocates the younger generation of producers and consumers of organic rice to improve productivity and food security. It deals with low external input technology, environmental preservation, input/output efficiency, and premium price accessibility Barrot,L. (2018). According to IFOAM Organics International, organic agriculture supports the objective of Sustainable Development Goals (SDGs) on improving food security, ensures healthy well-being, ensures sustainable consumption and production, combat climate change, and conservation of natural resources. Food security exists when all people have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for a healthy life Philippine Food Security Information System, (PhilFSIS) 2012). The application of organic production upholds food nutrition

security, improved agricultural productivity, resilient productive system, and protection of genetic resources to end hunger Setboonsarng,S. (2017).

Improvement of production alone is not sufficient to achieve better income and sustain food security. There is a strong need to know the demand in the market. Essential elements of sustainable food system are production, trends in consumption, accessibility of markets, economic viability, and alleviation of poverty Maghirang,R. et.al. (2013). As mentioned by Scialabba,N. (2007), “Organic agriculture” is not just about production. It includes the entire food supply chain, from production and handling to marketing. Essential in food security is the total improvements of diets of poor and non-poor households. Agricultural performance and awareness of food consumption affect the consumer behavior in planning its food consumption (Briones, R.,2017) stated that mindset and behavior affect consumption. The misconception that eating traditional food vegetables and root crops is not “cool” and that eating meat, foreign menus, and fast-food items is a status symbol (Brinzan,O. et.al.2012) mentions the possibility to buy more organic food comes along with agro-environmental strategies that control the use of pesticides and hazardous chemicals, organic farming protection, and information for the consumers.

Organic agriculture supports ecological balance and improves sustainable productivity where long-term food production ensures the stability of food security for feeding the society (Sitthisuntikul,K.,et.al.2018). Farmers are encouraged to practice organic agriculture in response to improving food security. However, the viability of organic agriculture is being challenged lead to a low level of implementation. The production, consumption, and distribution of organic rice fulfill the consumers’ needs and wants. Sustainable production and consumption are prerequisite in the worldwide struggle against sustainability challenges such as climate change, resource depletion, famines, or environmental pollution (Sustainable Development Goals, 2018). Chemical farming reduces food quality and increases the production cost, rendering a gradual decrease in farmer's income annually (Brown, E. 2015). From the previous years, rice production in the Philippines has been considered unproductive because of cost and efficiency. High cost of labor, land, fertilizers, and pesticides and out-migration of youth contributed to inefficient farming. This concern pushes the government and convinces the farmers to adopt ecologically sound and organic chemical-free farming methods of sustainable agriculture (Manigbas, NL,et.al. 2018). The shift in farming techniques improved the production, consumption, and distribution of accessible organic rice Sitthisuntikul, K., et.al. (2018).

The province of Oriental Mindoro (also known as the Rice Granary and top producers of rice in Southern Tagalog) was the study area. According to Provincial Agriculture, the reported farming area devoted to organic agriculture is 598.2 hectares,

while the current farming area by default is 8,886 hectares. These numbers of organic farmers can be a strategic direction of the province in the production of organic rice and ideal target areas for an increasing number of organic rice cultivation in region 4. Although difficult to quantify, non-certified organic systems (e.g. indigenous models that follow organic principles by intent or by default) number of small farmers represent a corresponding share in the continuance of organic agriculture (Scialabba, N. 2007). Thus, organic agriculture includes both certified and non-certified food systems Scialabba,N. (2007). There are two certified organic farms in Oriental Mindoro, while the rest are non-certified but recognized and assisted by the Provincial Agriculture and other government and non-government agencies.

Reviewed articles showed the long-term production of organic rice significantly influenced food security Sitthisuntikul,K.,et.al (2018); Meemken,E. (2018); and Surekha,K.,et.al.(2013). Consumption has impacted food security Brinzan, O., et.al. (2012); Demirtas,B. (2018); Hansmann, R. (2019); Diehl, J. (2019). This research aimed to determine the significant influence of organic farming on food security by understanding the efficiency of production, and consumption of organic rice. The focus was the province of Oriental Mindoro involving organic rice practitioners. In this concern, analysis was done at the local household level taking into account the micro-level of food security in the short-term period of three years 2016, 2017, and 2018. With the end view of proposing a theory of change based on the results to consider the potential approach for planning, a guide for decision making, implementation, and evaluation on the government and farmers organic goals and program as well as to contribute knowledge development for future research.

## 2. THEORETICAL BACKGROUND

Fulfilling the success of organic rice production attributed to an adaption of “theory of change” to formulate strategy and improve the implementation of organic agriculture programs enable to distinguish the impact of organic goals and programs to the transformation of conventional farming to organic agriculture.

Figure 1 Theory of Change

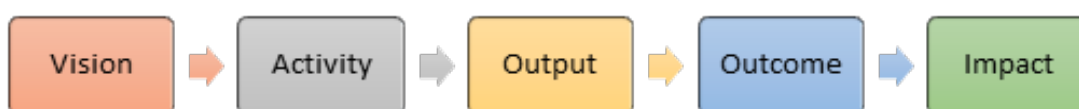


Figure 1 presents the adapted Theory of Change from the perspective of organic

agriculture for a sustainable development goal. This concept is extracted from the discussion of related literature and identified facts and information from this study. Theory of Change (ToC) evaluates the success of the programs and activities of the farming system. The conceived theory of change suggests that the efficiency and effectiveness of the programs and activities are easier to sustain and bring to scale.

The outcomes provide activities and programs that change the farmers' practices into a better, more profitable, and sustainable growth. Shifting from conventional farming to organic farming is not only a resilient change of agricultural system or technology but an individual and social transformation. The Theory of change was officially applied by different authors. The chief proponents of each theory of change were Auguste Comte (1798–1857), Herbert Spencer (1820–1903), and Emile Durkheim (1858–1917); Karl Marx (1818–1883); and Talcott Parsons (1902–1979), respectively (Serrat, 2017). Key principles and actions in developing interventions to improve health. Involving the stakeholders, reviewing published research evidence, drawing on current theories, conveying program theory, undertaking primary data collection, understanding context, paying attention to future implementation in the real-world O' Cathain, A. (2019).

RA 10068 aims at the promotion, propagation, development and implementation of the practice of organic agriculture in the Philippines. Implementation of organic agricultural programs, projects, and activities focused on the farmers and other stakeholders, establishment of facilities, equipment, and processing plants that would accelerate the production and commercialization of organic fertilizers, pesticides, herbicides, and other appropriate farm inputs (GOVPH, 2010). In this regulation, the researchers underline the importance of the theory of change to improve the strategic design and implementation of the organic agriculture development program.

## 2.1 Related studies

Adhikari, Raj K. (2011) mention in his study that the higher productivity of organic rice proved that organic rice production is a feasible option for the sustainable food production and food security. The organic enterprise is profitable in spite of no significantly differentiated organic market for organic commodities. Jierwiryapant,P. (2012) reported in their study that farmers were encouraged to participate in training to build a strong production and marketing network throughout the supply chain to sustain the organic rice production in Thailand. Karunasagara,I. (2015) argued that resolving long-term food security needed quality and safety in food production, continuous supply chain, environmental and social sustainability. The study of Canete, D. (2017) pointed out that the efficiency of farming services, the seed used, application of fertilizers, and

land area greatly influence rice production.

Both ecosystem, rice farmers utilized their know-how and resources for greater efficiency. Rainfed rice farmers had shown improved technical inefficiencies and lower return to scale in rice production. Damayanti, F. (2015) stated that information from social media and health factors in organic rice consumption determines consumption. Brinzan, O., et al. (2012) studied the food consumption and sustainability and describe some consumption habits and their impact on the environment. It was concluded that some key principles and challenges should include improving the quality of life of populations without compromising the resource needs of future generations is a need. Sustainable consumption and production are a practical approach in order to achieve a status of sustainable development which addresses the economy, society and environment. The concept has a strong social component, that of equity within and between generations, improvement of quality of life, consumer protection and corporate social responsibility.

### **3. OBJECTIVES OF THE STUDY**

The study determines the influence of organic farming by understanding the efficiency of production, consumption, integration of value chain, sustainability, and its implication on food security.

Specifically, this study aims to answer the following questions:

1. What is the efficiency performance of organic rice production?
2. What are the factors that influence the consumption of organic rice?
3. Based on the findings, are there evidence shown changes in input, activities, output, outcomes, and impact of organic agriculture on food security through the application of theory of change?

### **4. METHODOLOGY**

#### **4.1 Research Design**

This study used a quantitative descriptive research design involving the description of all the variables with emphasis on actual current conditions, practices, and situations. Survey questionnaires were used to obtain primary data on the production and consumption of organic agriculture.

#### **4.2 Respondents of the Study**

Respondents of this study are the owners of organic farms composed of 60 farmers. Data collection was done in the 1st and 2nd districts in the province of Oriental

Mindoro, inclusive of Calapan City and municipalities of Puerto Galera, Naujan, Victoria, Bongabong, Mansalay, and Bulalacao. The criteria for selection of the respondents are based on the list given by the Provincial Agriculture office, the source of the sample frame was the organic rice practitioner belongs to cooperative industry, farmers affiliated to an association and individual organic rice practitioner recognized by Provincial Agriculture. Out of 70 organic rice producers, 60 were available during the test period. Conferring to RAOsoft software calculator, a total sample size of 60 respondents represents the total population with confidence level of 90% and 4.82% margin of error.

#### **4.3 Data Gathering Procedure**

The survey started with the discussion of informed consent to the respondents, followed by personal interview with the key person and owner of the organic farm, interview with the municipal agriculturist technicians and coordinator of the organic production in the provincial agriculture office. Primary data were obtained through surveys and personal interview, secondary data were obtained from related literature, journals and articles. Subsequently the analysis and validation of data used an appropriate statistical tool enable to avoid biases.

#### **4.4 Data Analysis**

Data were then processed using the statistical tool, namely: Stochastic Frontier Analysis and Data Envelopment Analysis (DEA). The Stochastic Frontier Analysis (SFA) provided techniques for modeling the frontier concept within a regression framework having an error term decomposed into random variation ( $V_i$ ) and inefficiency portion ( $U_i$ ) (Cornwell & Schmidt, 2008). According to Kumbhakar and Lovell (2000), the Stochastic production frontier model takes the log-linear Cobb-Douglas form. In this study, a Slack Based Measure of Efficiency (SBM) determines the slacks in input variables and output variables. SBM – Data Envelopment Analysis (DEA) can be defined as the ratio of mean input and output mix inefficiencies (Cooper et al., 2000; Cardona et al., 2015). This study is an input-oriented DEA under VRS scale assumption because farmers operated at different scale sizes. The farmer's organic production assumed in the SBM - DEA corresponds to the mean proportional reduction rate of inputs or input mix inefficiencies and the relative proportional expansion rate of output (Cardona et al., 2015).

### **5. RESULTS**

This study investigates the efficiency of production and consumption, and its

implication to food security in accordance with the interview, perception of the respondents and extensive review of literature and related studies.

### **5.1 Efficiency performance of organic rice production.**

Table 1.a shows the efficiency summary of efficiently strong farmers in Oriental Mindoro, Philippines. The results showed that six (6) farmers in the lowland area were 100% efficient in their farm operation. They were located in Bongabong (farmer number 8), Victoria (farmer number 26), Mansalay (farmers 56 and 57), Calapan (farmer number 60), and Puerto Galera (farmer number 15). The results suggest a strong efficiency performance in overall or global technical efficiency ( $crste = 1.00$ ), local pure technical efficiency ( $vrste = 1.00$ ) or managerial efficiency, and scale efficiency ( $scale = 1.00$ ). The scale efficiency described the good (constant returns to scale, CRS) or bad (IRS or DRS) condition of a farm operation. These farmers that achieved 100% maximum performance was operating at the most productive scale size (MPSS). The studies of Ali (201a), Baceneti (2016), Canete (2017b) and Sudrajat (2018b) recognize the importance of the methods of land and soil preparation, the seed used and application of fertilizer. In addition, three (3) farmers located in the upland farm of Bulalacao were found managerially efficient ( $vrste = 1.00$ ) in their farm operations. This means that the farmers (46, 38, and 39) were efficient in managing their inputs (land area, seed preparation, labor, seeds, and organic fertilizer) during 2016 – 2018. Farmers 46, 38, and 39 have weak efficiency because they registered a 100% efficiency only in local pure technical efficiency or managerial efficiency ( $vrste = 1.00$ ). Weak efficiency of farmers indicated inefficiency in cost (overall or  $crste < 1.00$ ) due to an increasing return to scale (IRS) where the use of inputs was doubled to generate total yield at a faster rate. Thus, the scale efficiency score of less than 1.00 indicates that the farmers are over/under-dimensioned. Furthermore, the table shows the efficiency of three farmers in managing farm inputs only ( $vrste = 1.00$ ). in higher efficiency in rice production.

In addition, 25 farmers achieved above the scale efficiency of 0.604. Farmland were found in the lowland and irrigated with more than half not experiencing the bad effects of calamities in their area. The remaining 26 farmers obtained below the average scale efficiency score of 0.604. The observation on upsizing of farming operations incurred a shortage in total yield and excessive cost of inputs of Bulalacao farmers.

**Table 1.a. Efficiency summary of efficiently strong farmers**

	EFFICIENCY SUMMARY:				
	firm	crste	vrste	scale	rts
1 =Bongabong	8	1.000	1.000	1.000	crs
7 = Victoria	26	1.000	1.000	1.000	crs
4 = Mansalay	56	1.000	1.000	1.000	crs
4 = Mansalay	57	1.000	1.000	1.000	crs
3 = Calapan	60	1.000	1.000	1.000	crs
6 = Puerto Galera	15	1.000	1.000	1.000	crs
2 = Bulalacao	46	0.574	1.000	0.574	irs
3 = Bulalacao	38	0.080	1.000	0.080	irs
4 = Bulalacao	39	0.080	1.000	0.080	irs

Legend: crste - global technical efficiency

vrste - local technical/managerial efficiency

rts – retrun to scale

crs – constant return to scale

irs – increasing return to scale

Table 1.b. specified the effects of labor and seeds+organic fertilizers on the efficiency of organic production. It also showed a hypotheses test for selecting the full model (model 2 of Battese & Coelli 1995 specification). The values of sigma-squared ( $\sigma^2 = 0.447$ ,  $\rho = 0.001$ ) and gamma ( $\gamma = 0.811$ ,  $\rho = 0.001$ ) indicate that the farmers were not efficient in its mean annual earning of total yield and the distance between the best years of earning total yield (frontier or potentials of achieving total revenue) and the actual data are due to inefficiency and not due to random variation. Critical t-values passed the 5% level of significance indicating that the parameters (bi) are not equal to zero and inputs (labor and capital) affected the output (total yield). The value (= 128.32) of the likelihood ratio test of the one-sided error is greater than the value of 21.67 at 0.001 level of significance (Kodde and Palm table) and 6 degrees of freedom (number of restrictions = 6) implying that the assumption on a general truncated (reduced) normal distribution ( $\mu \neq 0$ ) where mean (mu) is not zero and the time-varying (2016 - 2018) efficiencies passed all expectations. So, the two distributions in this paper are normal for the stochastic portion ( $V_i$  = random variation) and a half – normal for the technical inefficiency portion ( $U_i$ ). Also, the likelihood ratio test implied that the SFR - MLE estimated appropriately the total yield than the ordinary least squares (OLS) of the classical statistics. The use of seeds and quantity of fertilizer contributed about 16% and labor cost added 70.4% to total yield with an overall effect of 86%. This indicates that the use of inbred seeds and the application of fertilizer have a great influence to



increase rice yield. The cost of labor has a parallel contribution to rice yield. Thus, the increasing value of this variable contributes to the increase in rice yield. Meemken,E. (2018), Sudrajat,I. (2018), Canete,D. (2017), Baceneti,J. (2016), Ali,E. (2013), Chen,Y. (2012), AdhikariR. (2011), Khai,H. (2011), and Surekha,K. (2013) found a positive relationship on the influence of labor, seeds, fertilizer, and application of pesticides to the efficiency of the yield. Among the determinants, organic farming was typically more laborious in weeding, application of organic fertilizers, and other operations, particularly in upland farmland. As stated by the farmers, maintaining and increasing yields requires large quantities of organic materials, extensive production of organic fertilizer, and slow decomposition of organic matter. Organic matter available at the farm itself is not sufficient forcing farmers to purchase additional organic materials that were an added cost to the farmer particularly when the supply of organic matter in the local market is limited (Meemken,E. 2018).

**Table 1.b. Effects of labor and seeds+organic fertilizers on the efficiency of production.**

Stochastic Frontier Estimates		mle		
parameter	Variable	coefficient	t-ratio	sig.
b <sub>0</sub>	Constant	2.171	13.205	0.001
b <sub>1</sub>	Labor (PhP/m <sup>2</sup> )	0.704	6.165	0.001
b <sub>2</sub>	seeds+org.fert (Php/m <sup>2</sup> )	0.158	2.427	0.008
<b>Inefficiency effects</b>				
d <sub>0</sub>	constant	-0.340	-0.462	n.s.
d <sub>1</sub>	<i>Farming exper. (years)</i>	0.067	3.078	0.002
d <sub>2</sub>	riceland type (1 = lowland, 0 = upland)	-2.492	-4.618	0.001
d <sub>3</sub>	water source (1 = irrigated, 0 = rainfed)	1.755	2.970	0.002
d <sub>4</sub>	Calamity incidence (1 = with, 0 = without)	0.957	2.425	0.007
σ <sup>2</sup>	sigma-squared	0.447	6.307	0.001
γ	Gamma	0.811	13.490	0.001
dependent variable = Total yields (PhP/m <sup>2</sup> )				
LR test of the one-sided error = 128.32 > 21.67				
with number of restrictions = 6				
[note that this statistic has a mixed chi-square distribution]				
Kodde & Palm (df = 6, 0.001) = 21.67				

The results of MLE-SFA computations showed that the average total yield of the farmers at the beginning of 2016 was PhP8.77 per sq. m. (=antilog of 2.171). For every 100% use of inputs, labor contributed 70.4% and capital (seeds + organic fertilizer) contributed 15.8% to increase the total yield of farmers in Oriental Mindoro, Philippines. The sum of the coefficients of labor and capital ( $0.863 = 0.704 + 0.158$ ) reflects a decreasing return to scale (DRS) of the farming activities of the farmers.

## 5.2 Factors that influence the consumption of organic rice.

Table 2 shows the allocation of organic produce. A large part of organic rice produced is for household consumption and a small part for commercial trade. Organic rice cultivation directly (self-consumption) and indirectly (improved income, improve access) affected household food security. Food supply protects food insecurity through improvements in quantity, quality, nutrition, and promotes sustainable agriculture Diehl,J. (2019). According to the farmers, the health benefits of organic rice made them decide to consume organic rice. Their family members enjoy the quality of life with less incidence of hospitalization. Consumer behavior changes considerably in food consumption, agro-environmental strategies, and the use of chemicals, and or pesticides in organic farming Brizan,O.,et.al. (2012).

**Table 2. Consumption of organic rice**

Location	Allocation			
	Household Consumption		Commercial/ Trade	
	Freq.	%	Freq.	%
1. Bongabong	2	15%	11	84%
2. Bulalacao	28	100%		
3. Mansalay	1	33%	2	66%
4. Victoria	1	50%	1	50%
5. Naujan	3	60%	2	40%
6. Puerto Galera	6	85%	1	15%
7. Calapan	1	50%	1	50%
Total	42	70%	18	30%

Based on the interviews, the price of organic rice cannot be compared with the price of rice regularly purchased by the consumers because the price of organic rice depends on the type of organic certification. Compliance costs for certification

(inspection and registration and others) influenced the price increase in organic rice. Farmers perceived that consumer bought organic rice because of its quality and reasonable price. The study of Sitthisuntikul,K.,et.al. (2018) stated that consumers of smallholder farmers in Thailand are willing to pay for organic products without bargain because they trusted the product quality. Price has no significant effect on the organic rice consumers in Thailand. According to the certified organic rice farmers, rice was transported directly to supermarkets and malls in Manila City. While non-certified organic rice distributes its products to the local community like the cooperative, trading post, exhibit, bazaar, and direct selling to the local consumers. Mostly their buyers came from the professionals like doctors and nurses, hotel and restaurant owners, and health-conscious people, and a majority of the consumers are willing to pay a higher price for organic rice. In comparison, studies of Hansmann,R.(2019) and Demirtas,B. (2018) cited that consumption of organic products is highly related to the consumers' interest in food safety, health, and environmental preservation and price. Among the factors, the price has no significant effect on the consumption of organic rice. Demirtas,B. (2018) found that price and its availability (varieties and irregularity) influenced consumption of organic rice. Currently, the higher price of organic rice applies in favor of the certified producers. According to the farmers, a higher price of organic rice is advantageous, but a higher price limits the demand. Typically, most of their consumers in the community are not sufficiently rich. Demirtas,B. (2018) found the factors that prevent organic consumption are high prices, deficiencies in consumer awareness, and promotion. Price of rice always fluctuates over time. Therefore, promoting policies aimed at sustainable growth in rice yield and price will be the basis for sustainable development in the rice subsector in in the future (Nguyen Huu Dang, 2017). The interview revealed that consumers who live further from the production site have a higher demand for certification. On the other hand, consumers who live within the community trust and care more about the farm environment and have a lower demand for certification.

### **5.3 Organic Farm Theory of Change**

Based on the findings of the study activities, output, outcomes and impact has been created. Table 3 presents the Theory of change model that was adapted signifying the relationship on how the use of resources (activities) produce a group of (output and outcomes). Valuing what aims to be changed and what goals to be achieved enable to transform not only the structural change in organic agriculture but also the behavioral characteristic of the society into a better perspective way. This theory of change can be baseline data in planning, a guide for decision making, and future research undertakings.

**Table 3 Theory of Change of Organic Farm in Oriental Mindoro**

<i>Activity</i>	<i>Output</i>	<i>Outcome</i>	<i>Impact</i>
<b>PRODUCTION</b>	<p>Improved knowledge and skills.</p> <p>Proper land utilization</p> <p>Well-organized farm management method and cost-effective production system.</p>	<p>6 strong farmers in the lowland area succeeded 100% efficiency.</p> <p>3 farmers in the upland attained managerial efficient.</p> <p>25 farmers achieved under mean efficiency.</p> <p>26 farmers obtained below efficiency in soil quality, crop diversification, soil fertility management, integrated pest and disease management, nutrient management</p>	<p>Stable and available nutritious and safe food for household consumption.</p> <p>Needed more effort to attain the 100% efficiency increasing return to scale.</p> <p>Need to conduct the feasibility of mass production of organic fertilizers for commercial purposes.</p>
<b>CONSUMPTION</b>	<p>Improved knowledge on the nutritional benefits of organic rice.</p> <p>Portion of organic rice allotted for commercial undertakings</p>	<p>100% Health and wellness of household members.</p> <p>Added income for the household.</p>	<p>70% Available and accessible supply of organic rice for household consumption.</p> <p>30% available and accessible supply of organic rice sold to market.</p> <p>Availability and accessibility is limited to niche market consumers.</p> <p>Price of organic rice suitable for niche market.</p>

## 6. CONCLUSION

Based on the findings of this study, the following conclusion are drawn:

Efficiency performance in both lowlands irrigated and upland rain-fed farmers were able to attain the desired level of production efficiency. Several farmers were able to achieve 100% efficiency but some of them have above-average efficiency. However, farmers experience a decreasing return to scale (DRS) in the overall efficiency

performance due to incidence of calamity particularly flooding. The decreasing performance signifies that more effort is needed to reach the overall efficiency in producing organic rice. Restoration of flooded lowland farms resulted in a high cost of labor, seeds, and fertilizer. Therefore, the need to control the incidences of flooding is deemed necessary. The rice yield efficiency was affected by the practice of a low or no external input farming system in the upland area. Thus, the importance of production management of organic fertilizer. There is also a need to venture into the organic enterprise to stimulate community welfare through efficient production, increase farm size, and stable food security.

The result of the mean average and percentage on consumption of organic rice confirmed that most of the respondent's intentions in the producing organic rice is to secure their household health and wellness rather than for commercial success. The respondents were able to maintain food production, livelihood, social relationship and environmental conservation which led to stabilized sufficient household economy and food security. Allocation of organic produce positively affects the consumption of organic rice it depicts stability and availability of nutritious food, particularly at the household level. Business ventures in organic rice generated income to support the growth of local communities. Commercial consumption of organic rice created a different market. The certification cost of organic farms attributed to the price of organic rice. Certified organic rice practitioners supply the "niche" market located in the malls in metro manila. For the niche market, the consumer's price is not a significant factor. Most practitioners of non-certified organic rice accommodate the consumers within their local community that demand a lower price. Currently, the market share of organic rice is limited to people who have realized the health benefits of organic rice and can afford the price of organic rice. Thus, there is a need to explore the potentials of modern markets (supermarkets and malls) in increasing the consumption of organic rice.

The theory of change model that was generated signify the underlying principle that describe the relations between the input and output and why outcome is needed to achieve an impact. Theory of change start from the baseline analysis of the context and issues intended to generate sequence of changes necessary to support the desired long-term change. It is an on-going process that evaluates the success of the programs and activities enable to sustain and bring to scale the farming system. Organic cultivation is not only a resilient structural change but also the transformation in the behavioral characteristic of the community into a better society.

## **7. RECOMMENDATION**

From the findings and conclusions of the study, the researchers arrive with the following

recommendations;

To increase the efficiency performance farmers can increase output by 2.5 times in response to a doubling of all inputs to exhibit increasing returns to scale. Enhance the existing training program on the production of organic fertilizers in the upland area. A feasibility study should be conducted on the mass production of organic fertilizers for commercial purposes to ensure viability. The current study provides an insight to the government on mitigating the organic rice farming in flooded fields of Mindoro. Effective and efficient implementation of the organic agriculture law can oblige a widespread promotion of organic agriculture.

The increased awareness of the health benefits of organic rice is an opportunity to increase the consumption of organic rice. Intensify the consumption of organic rice for trading to be able to contribute to the food security of the community. Farmers should actively engage in value-adding activity and massive information drive on the health benefits of organic rice and increase their awareness on the needs and want of their consumers to position organic rice. Government provision on organic agriculture can increase the consumption of organic rice as well as address the food insecurity in the province by enhancing the stability of organic rice in the market. Modify the market position of organic rice not only to the niche market but for everyone.

The theory of change is a desirable approach to improve organic rice farming strategy; and, valuing what aims to be changed and what goals to be achieved. This theory of change model can be baseline data for strategic planning, monitoring and evaluation, a guide for decision making funding and future research undertaking.

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