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Econometric Modelling On Satisfaction In Rice Farming Under Philippine Rice Tariffication Law

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Abstract

This study focused on the farmers' satisfaction and its influencing determinants under the implementation of Rice Tariffication Law (RTL) in Leyte, Philippines. Currently, very limited studies are available in literature regarding the Law. Hence, this study is conducted to evaluate the farmers' satisfaction while experiencing the Law. With the aid of probabilistic sampling method, the study employed 169 rice farmers as the participants. A developed questionnaire was used to gather primary data and analyzed using descriptive statistics and econometric modelling. Results showed that the farmers' actual satisfaction is relatively lower compared to expected satisfaction. This is due to negative effects of RTL. The study documented a significant socio-demographic determinants of satisfaction in farming, namely: gender, marital status, education and rice farm ownership. Income from rice farming has inverse effect on satisfaction. Farmers with high income also experience high expenses in agricultural inputs which negatively affects their well-being. A low other monthly income of farmers has a chance of being satisfied in rice farming. Satisfied farmers spend more time in farming and results to higher opportunity cost for other income activities. Furthermore, household consumption, household assets, and household expense positively affects satisfaction of farmers due to the benefits and comfort.

Keywords: Rice Tariffication Law, farmers' satisfaction, probabilistic sampling, econometric modelling

Introduction

The main crop produce by the Philippines is rice which is a center of government agricultural policies. Perhaps, rice is the most significant staple food in the country (Yagos and Demayo, 2015). Apparently, the Philippine government are focusing on promoting food sufficiency, providing enough income to farmers and making prices affordable to the consumers. One of the policies of the government about the crop rice is the Rice Tariffication Law (RTL). RTL is an act liberalizing the importation, exportation, and trading of rice, lifting for the purpose the quantitative import restriction on rice, and for other purposes (House of Representatives, 2019). This policy was signed into law by the Philippine President on February 14, 2019 that amends the Agricultural Tariffication Act of 1996 that imposed tariff to agricultural imports except for rice (Tobias, 2019). The purpose of the law was to solve the surging inflation of rice price that makes the Filipinos

continue to struggle. However, as the Law was implemented, the price of palay has suddenly drop which affects the income of local rice farmers nationwide. This is due to the price of agricultural inputs that remains high while the output was relatively low because of oversupply of imported cheap rice (Santiago, 2019). Hence, the level of satisfaction of the rice farmers was negatively affected.

The province of Leyte, Philippines, has a wide farm for rice and rice cultivation in this location is associated with traditional farmers who are aging farmers with low education and are living below poverty line (Koirala et al., 2014). And one of the Barangays in the town of Hilongos, Leyte, which is considered as one of the rice producing farm is Barangay Tabunok. This Barangay has a wide area for rice farming and it is the main source of income to the residents. In 1987, a local government project was successfully implemented in the barangay, that is, an irrigation system. It was completed into its full operation which brought blessing to all the farmers, particularly, to rice farmers. To date, the rice farmers continually tilled rice farms for family consumption and for income purposes. However, due to the surging inflation of rice price in the country during the last quarter of the year 2018 after the rice stocks of National Food Authority (NFA) ran out, hence RTL was prompted (Tobias, 2019). But as the Law was implemented, some negative effects was experienced by the rice farmers. In fact, farmer groups appeal that RTL will make them compete with cheap price rice imports, as a result, [it] makes them more penniless (Punongbayan, 2019). Hence, this study was conducted to evaluate the farmers' satisfaction and determine its influencing socio-economic factors under the implementation of RTL.

Seemingly, there are only limited studies available in the literature about establishing a connection between satisfaction in rice farming and their farming factors using econometric modelling. In generally, the aim of this study is to investigate the different socio-economic and farming factors of satisfaction of farmers under the implementation of RTL. Results of this current study might impact the well-being of rice farmers and improve existing policy in rice production and price regulation in the country.

Conceptual Framework

In the findings of Kamaruddin and colleagues (2013), the well-being and satisfaction of farmers is very important factor in productivity and efficiency in rice production. In the study of Dullas and Acoba (2013), and Sarmiento (2011) it is found out that farmers in the country have high level of satisfaction and are also resilient despite of the hardships. This is because they are motivated and optimistic for their work farm and family. And well-being is highly associated by income which is very important target of every individual (Kahnemann & Deaton, 2010). According to Tobias (2019), in the Philippines, local rice farmers' income is negatively affected by the RTL due to the oversupply of cheap rice coming from the outside country. At first, the main concern of the Law is to help expand the access of Filipinos to cheap rice and prevent inflation pitch brought in large part by the supply. But the side effect is the low price of rice farmer's output which drop their income low while the price of agricultural inputs are increasing through time. Hence, the farmers' lives and satisfaction were affected which affects farmer's productivity. In fact, Markussen et al. (2018) reveals that aside from income there are other different economic factors that influence the level of satisfaction of a rice farmer. Hence, in general, the farmers' satisfaction is being investigated in regards to different socio-economic and rice

production factors. With the aid of ordered logit modelling, the study deals specifically the following objectives: 1) to describe the socio-demographic profile of rice farmers; 2) to estimate the actual and expected satisfaction in rice farming and 3) to document significant determinants affecting the level of satisfaction of the rice farmers under Philippine RTL.

Methodology

The Research Design

The research design used in this study was based on the findings of Markussen and colleagues (2018) and the study of Adam and Pebrian (2017) that deals with factors affecting farmers' satisfactions which involves inferential methods. A primary data was collected during the implementation of Rice Tariffication Law on the socio-demographic profile, level of satisfaction in farming and its factors using a developed and structured questionnaires. In data analysis, descriptive measures was used such as percentages, minimum, maximum, mean and standard deviation to describe and evaluate the variables. For inferential analysis, ordered logit modelling was obtained to determine the significant economic factors of satisfaction in rice farming.

The Respondents, Sampling Method, and Ethical Procedure

The population of interest were all currently active rice farmers in Barangay Tabunok, Hilongos, Leyte, Philippines during the conduct of the study. Simple random sampling was adopted in selecting the desired respondent of this study to ensure unbiased data. Random sampling was based on the random numbers in the scientific calculator to make sure that every farmer has an equal chance of being selected. In determining the sample size, the following formula was employed:

$$n_0 = \frac{Z^2_{\alpha/2}(0.5)(1-0.5)}{e^2} \quad (1)$$

where n_0 refers to the sample size, $Z_{\alpha/2}$ refers to the confidence interval, and e refers to the margin of error. This study used 95% confidence interval, which suggest that the sample is certain 95% of the time. Since there is limited information available for the respondents in the barangay, then it was assumed that the proportion would be 0.5. The said proportion is a worse-case assumption while a close to 1 proportion suggest the best-case assumption (Cochran, 1953). Now, since the population is known to be finite, then it is necessary to adjust the computed sample size with the following formula:

$$n = \frac{n_0}{1+\frac{n_0}{N}} \quad (2)$$

where n refers to the adjusted sample size, n_0 refers to the initial sample size and N refers to the total number of farmers. Then, a list of all farmers was obtained from concerned officials in the barangay to determine the rice farmers to be interviewed. Meanwhile, alternative rice farmer were drawn in case the selected farmer is not available or refuses to participate in the survey. For ethical procedure, the farmers were educated that the participation of the said survey was voluntary. Perhaps, prior to the conduct of the study, rice farmers were assured that all information gathered were treated with high confidentiality and solely used for this study only.

The Data Gathering and Survey Instruments

The permission of the Barangay Captain was asked before the conduct of the study. A developed survey questionnaire method through face-to-face interview was carried out to collect the data from the farmers. In the first part of the survey questionnaire, the farmers were asked about their demographic profile. The content of the survey questionnaire was design and compiled from the previously published studies of Adam and Pebrian (2017), Guazzelli & Zilli (2016), Lyubomirsky and Lepper (1999), and Markussen et al. (2018). The target of the questionnaire to measure the subjective actual and expected level of satisfaction in farming under the Philippine Rice Tariffication Law and determined its influencing economic factors. The level of satisfaction in farming is completed by choosing a scale from 1 to 10: 1 being a very unsatisfied and 10 a very satisfied. The level of satisfaction is considered as the dependent variable in this study which is ordinal in nature. Prior to the conduct of the survey, the said questionnaire for satisfaction in farming has undergone pre-testing and reliability test. By the aid of Statistical Packages for Social Sciences (SPSS) v.20 it is found out that the instrument for satisfaction is valid and reliable with Cronbach's α equal to 0.86 for 2-item questions. Furthermore, the respondents were clearly educated about the questions so that they may understand and give a reliable answer.

The Data Analysis and Econometric Models

Descriptive statistics was computed in order to describe and evaluate the variables of interest in this study with the aid of SPSS v.20. Also, this section presents two econometric model designed to examine more carefully the relationships between farmers' level of satisfaction and its influencing economic factors. The econometric models were ordered logistic regression which is an ordinal regression model that deals with ordinal dependent variables (Williams, 2016). To arrive a valid results for interpretation, the following models was subject to some diagnostic test using a statistical software called STATA v.14 (Stock & Watson, 2007). The first econometric model is given by:

$$\begin{aligned} ASatisfaction_i = \beta_0 + \beta_1 age_i + \beta_2 male_i + \beta_3 HHsize_i + \beta_4 education_i \\ + \beta_5 married_i + \beta_6 Farea_i + \beta_7 yearsF_i + \beta_8 HYvariety_i \\ + \beta_9 owner_i + \varepsilon_i \end{aligned} \quad (3)$$

where i denotes the i^{th} farmer in the sample, $\beta_0, \beta_1, \beta_2, \ldots, \beta_9$ are parameters to be estimated, ε_i is the random errors, $ASatisfaction_i$ is the actual level of satisfaction during the implementation of Philippine Tariffication Law (scale of 1-10), age_i is age of farmers measured in years, $male_i$ is a dummy variable that captures the male farmer (1-male and 0-female), $HHsize_i$ is the household size of the farmer, $education_i$ refers to the farmer's number of years in education, $Farea$ refers to the rice farm area (in hectare) manage by a farmer, $married_i$ is a dummy variable that captures the married farmer (1-married and 0-otherwise), $yearsF_i$ refers to the farmer's number of years in rice farming, $HYvariety_i$ is a dummy variable that captures the farmer's rice variety currently used (1-higher yielding variety and 0-traditional variety), and $owner_i$ is a dummy variable that captures a farmer

who owned a rice farm (1-owner and 0 - non-owner). The second econometric model is given by:

$$ASatisfaction_j = \theta_0 + \theta_1 \log(yield)_j + \theta_2 \log(Finputs)_j + \theta_3 \log(Mincome)_j + \theta_4 \log(HHconsumption)_j + \theta_5 \log(OMincome)_j + \theta_6 \log(Fassets)_j + \theta_7 \log(HHassets)_j + \theta_8 \log(HHexpense)_j + u_j \quad (4)$$

Where j denotes the j^{th} farmer in the sample, $\theta_0, \theta_1, \theta_2, \ldots, \theta_8$ are parameters to be estimated, u_j is the random errors, $ASatisfaction_j$ is the actual level of satisfaction during the implementation of Philippine Tariffication Law (scale of 1-10), $\log(yield)_j$ is a common logarithm of yield (in peso) for one cropping season, $\log(Finputs)_j$ is a common logarithm of all production cost (in peso) for one cropping season, $\log(Mincome)_j$ is a common logarithm for the farmer's monthly income (in peso) in rice farming, $\log(HHconsumption)_j$ is a common logarithm for the value (in peso) of household consumption for rice in one cropping season, $\log(OMincome)_j$ is a common logarithm for the farmer's other monthly income (in peso), $\log(Fassets)_j$ is a common logarithm for the value (in peso) of all farm assets of a farmer, $\log(HHassets)_j$ is a common logarithm for the value (in peso) of all household assets of a farmer, and $\log(HHexpense)_j$ is a common logarithm for the value (in peso) of the farmer's monthly household expense.

Results and Discussion

This section presents the descriptive measures for the socio-demographic profile and production data of rice farmers in one cropping season. For inferential methods, the comparison test between expected and actual level of satisfaction and econometric models that determines statistically significant determinants that affects the satisfaction of farmers were also presented and discussed.

Descriptive Measures of Variables of Interest

Table 1 reveals that the average age of rice farmers is close to 54. This infers that most of the farmers are relatively old since the younger residence were looking for a decent job outside barangay and some have migrated to other places. Dominantly, rice farmers are male and married with 4 members in the family. Most of the farmers are high school level. Their knowledge learned from their educational attainment are helpful in actual working activities in the farm. Apparently, most of them are experienced (25 years in farming) in farm activities. About 22% of these farmers owned their farm unit and the rest are in tenant status (Table 1). To date, almost all (80%) of the rice farmers are using high yielding variety of rice. Also, this type of variety has a short production period compare to traditional one. The monthly income from rice farming is relatively low (PhP 4926.10) due to the high farm inputs (Table 1). Perhaps, their income is just enough for their household expense which infers that farmers don't have savings. Further, since the price of output is low, farmers decided not to sale but use it as a household consumption. Other monthly income is also low because they devoted themselves to farming and no much time for other opportunities. On the average, the value of farmers' farm assets is closed to 11377.81 PhP. This refers to the market value of tools, equipment and farm work animals. The market value of farmer's household assets is approximately 48465.28 PhP which refers to the durable goods.

Table 1.

Socio-demographic profile of rice farmers and rice production summary in one cropping season ($n = 169$)

VARIABLES	MEAN	MINIMUM	MAXIMUM	STD. DEV.
AGE (YEARS)	54.36	22	89	12.68
MALE	0.80	0	1	0.40
HOUSEHOLD SIZE	3.89	1	9	1.57
EDUCATION (YEARS)	7.50	1	16	3.08
FARM AREA (HECTARE)	0.70	0.125	4	0.55
MARRIED	0.79	0	1	0.41
YEARS IN FARMING	25.49	1	68	15.68
HIGH YIELDING VARIETY	0.84	0	1	0.37
FARM OWNER	0.22	0	1	0.41
YIELD[a]	34800.59	6000	184000	27087.38
FARM INPUTS[a]	15096.18	2000	115200	14596.92
MONTHLY INCOME[a]	4926.10	129	21250	3835.43
HOUSEHOLD CONSUMPTION	2061.54	500	14000	1494.42
OTHER MONTHLY INCOME[a]	1272.19	0	21000	1947.005
FARM ASSETS[a]	11377.81	0	209000	26400.46
HOUSEHOLD ASSETS[a]	48465.28	500	1126510	102136.7
HOUSEHOLD EXPENSE[a]	4913.23	1100	22433	2964.98

Note: a - Philippine Peso

Expected and Actual Level of Satisfaction

Figure 1 shows that after the RTL was implemented, farmers' actual satisfaction are relatively low compared to expected satisfaction. Perhaps, by Wilcoxon Signed Ranks Test, the two level of satisfaction is significantly different ($Z_c = -7.941, p\text{-value} < 0.001$) which infers that expectation gap in satisfaction is significant at 1% level. This suggest that, before RTL and rice farming starts, farmers have expected some positive effects from the government program but disappointed with the actual situation. Predetermined goals of farmers are not being met at time of harvesting and these farmers are expecting to have a good economic profit that will compensate the agricultural expenses and labor costs. This

results is parallel to the research paper of Pandey and colleagues (2010) that deals with Rice Price Crisis.

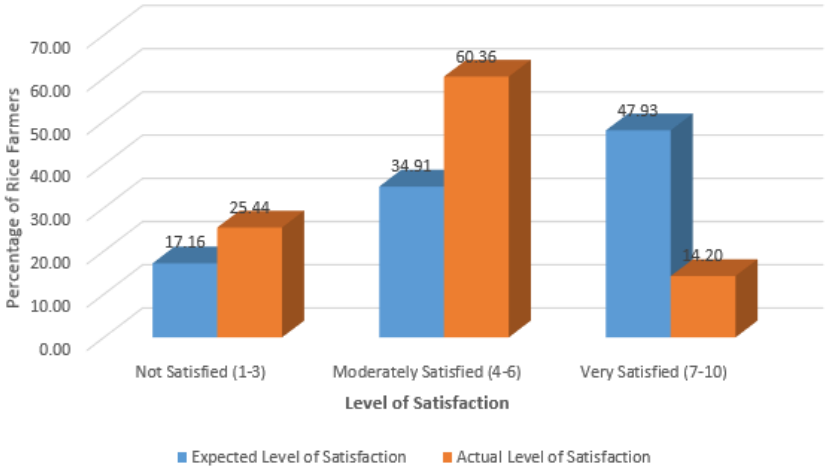

Figure 1. Level of Satisfaction in Rice Farming Under Rice Tariffication Law (n=169)

Econometric Models

Using multicollinearity test, the following two models was constructed which highlights statistically significant socio-economic determinants of farmers' satisfaction (Table 2). The two models are both significant at 1% level (**Model I**:$\chi^2 = 45.43,\ p$-value< 0.001, **Model II**: $\chi^2 = 54.33,\ p$-value< 0.001) which implies that the combined effect of all the variables in the model is different from zero. Thus, these two models have some relevant explanatory power to explain the actual satisfaction of the rice farmers under RTL. Table 2 shows that age does not influence the satisfaction of farmers. Most of the farmers' age in the Barangay are relatively old since other options are existing, younger generations are looking for decent job with higher salary. Female farmers are more satisfied than male (Table 2). They feel that household chores are routinely and boring unlike farming they can breathe fresh air and able to relax. Perhaps, their contributions are certain and necessary to rice farming. This result is parallel to the study of Centino and Vista (2018) that deals with farmers. Education plays a contribution on satisfaction on farming (Table 2). The knowledge learned by farmers is helpful in the farm which make them competitive compare to others. Being a married farmer is more satisfied, for the reason that having a family is a source of motivation to earned money for a living. A farmer who owned a large rice farm tends to be more satisfied and motivated in the job. This goes to infer that a farm owner does not worry during the harvest since he/she does not give share to someone. This results is consistent to the study of Koirala and colleagues (2014). It is worth noting that income from farming and other income has inverse effect to their satisfaction (Table 2). This implies that a farmer with lower income tends to be satisfied because of lower corresponding expense during the implementation of RTL. This results is not consistent to the existing study in happiness and income (Frey & Stutzer, 2010). Also, a negative effect of other income implies that if a farmer devoted more time in rice farming, opportunity cost for looking other income increases. Table 2 also reveals that rice household consumption contributes to satisfaction of farmers. This infer that the farmers chose not

to sale their output after harvesting because of cheap price due to oversupply of rice in the country. Instead farmers used their output as family consumption. Household assets is also an indicator to their satisfaction which consistent to the study of Adam and Pebrian (2017). This means that if a farmer has more assets, then they are more satisfied and happy due to the benefits and comfort. Furthermore, a farmer's family with more monthly household expenses contributes to farmer's satisfaction in farming. This implies that if farmer's income is spent more in food and other family needs, then a farmer is contented and happy.

Table 2.

Econometric models for level of satisfaction among rice farmers and its influencing determinants (n=169)

INDEPENDENT VARIABLES	MODEL I			MODEL II		
	COEFFICIENT	*STD ERROR*	*p-value*	*COEFFICIENT*	*STD ERROR*	*p-value*
age	0.0324	0.0212	0.1260	-	-	-
$male$ *(dummy)*	-0.9705**	0.4498	0.0310	-	-	-
$HHsize$	0.1283	0.1124	0.2540	-	-	-
$education$	0.1910***	0.0603	0.0020	-	-	-
$married$ *(dummy)*	0.9846**	0.4563	0.0310	-	-	-
$Farea$	1.0417***	0.3346	0.0020	-	-	-
$yearsF$	-0.0164	0.0170	0.3360	-	-	-
$HYvariety$ *(dummy)*	-0.1269	0.4559	0.7810	-	-	-
$owner$ *(dummy)*	0.8065**	0.4079	0.0480	-	-	-
$\log(yield)$	-	-	-	8.4966*	4.6560	0.0680
$\log(Finputs)$	-	-	-	-2.1679	1.9017	0.2540
$\log(Mincome)$	-	-	-	-5.5796*	2.9774	0.0610
$\log(HHconsumptio$	-	-	-	2.2851***	0.8051	0.0050
$\log(OMincome)$	-	-	-	-0.2477*	0.1409	0.0790
$\log(Fassets)$	-	-	-	-0.0664	0.1280	0.6040
$\log(HHassets)$	-	-	-	0.8847***	0.3288	0.0070
$\log(HHexpense)$	-	-	-	2.2377**	0.9928	0.0240
Pseudo R-squared	**0.1445**			**0.1728**		

Note: * - significant at 10% level.
** - significant at 5% level.
*** - significant at 1% level.

Conclusions, Policy Implications and Recommendations

The general objective of this study focused on determining the socio-economic factors of satisfaction and well-being of rice farmers on the ratification of the RTL in the Philippines. Results suggested that the new Law has negative impact to the well-being of local rice farmers. In the new law, rice imports are cheaper than domestically produced rice. Thus, local farmer's income has dropped due to the cheap price of output from harvest and high prices of agricultural inputs. As a result, their income is not even enough for their

monthly household expenses. The price of agricultural inputs must be properly regulated to help local farmers improve their economic profit despite of the implementation of RTL. A programs that would increase farm income may have positive effects on their satisfaction. When a farmer has improve its income, then additional income might be invested for farm assets.

It is concluded that the local government must provide a workshop seminar to educate farmers in improving their rice production activities. New techniques and skills learned is very useful in improving productivity in farming as well as the farmer's satisfaction. Results showed that women's satisfaction in farming is better compared to male. Thus, policy makers in the country must build an organizational program that will help and promote women farmers to improve their well-being and participation in the social enterprises. Conclusively, the main concern of the government and policy makers should focus on how to prevent million rice farmers from getting poorer because of the negative effect of the new law. A proper implementation of the law must be considered so that consumer and producer should benefit from the law. Policy makers must consider the local farmers' well-being and to have decent living conditions. Also, the country must not rely on rice imports that makes vulnerable to higher world market prices but support the local rice farmers instead.

It is recommended that similar study should be conducted in other parts in the country with larger sample size of rice farmers in order to gather more reliable and sufficient information on the socio-economic factors of satisfaction. Furthermore, it is strongly recommended for further research on satisfaction in farming to include variables related to farmers' access to credit and savings account which are potential limitations of the current study.

References

Adam, N. S. and Pebrian, D. E. (2017). Factors affecting farmers' satisfactions with mechanized rice harvesting in Malaysian paddy fields: A case study of hiring custom operators. *Agricultural Engineering International: CIGR Journal, 19*(2), 120–128. Retrieved from http://www.cigrjournal.org

Centino, Z. M. H. & Vista, A. B. (2018). Determinants of corn farmers to adapt to climate change impacts in Sagbayan, Bohol, Philippines. *Annals of Tropical Research, 40*(2), 77-89. doi: 10.32945/atr4027.2018

Cochran, W. G. (1953). *Sampling Techniques.* John Wiley and Sons, Inc. New York.

Dullas, A. R., & Acoba, E.F. (2013). *Concept of happiness among Filipino farmers: A qualitative and quantitative view.* LAP Lambert Academic Publishing, Germany.

Frey, B. & Stutzer, A. (2010). *Happiness: A New Approach in Economics*, CESifo DICE Report, Center for Research in Economics, Management and the Arts, Switzerland.

Guazzelli, G. P. & Zilli, J. B. (2016). Economics of Happiness: A Study on Happiness Indicators in University Professors. *ECOFORUM, 5*(1), 171-181. Retrieved from http://www.ecoforumjournal.ro/index.php/eco/article/view/276/211

House of Representatives. (2019). *An Act liberalizing the importation, exportation, and trading of rice, lifting for the purpose the quantitative import restriction on rice, and for other purposes*. Retrieved from

http://www.congress.gov.ph/legisdocs/ra_17/RA11203.pdf

Kahnemann, D. & Deaton, A. (2010). High income improves evaluation of life but not emotional well-being. *Proceedings of the National Academy of Sciences, 107*(38), 16489-16493. Retrieved from https://doi.org/10.1073/pnas.1011492107

Kamaruddin, R., Ali, J. & Saad, N. M. (2013). *Happiness and its Influencing Factors Among Paddy Farmers in Granary Area of MADA*. Proceedings Book of ICEFMO. PAK Publishing Group. Malaysia

Koirala, K. H., Mishra, A. K. & Mohanty, S. (2014). *Impact of Land Ownership on Productivity and Efficiency of Rice Farmers: A Simulated Maximum Likelihood Approach*. A Paper Presentation. Agricultural and Applied Economics Association, Philippines.

Lyubomirsky, S. & Lepper, H. S. (1999). A measure of subjective happiness: Preliminary reliability and construct validation. *Social Indicators Research, 46*, 137-155. Retrieved from https://link.springer.com/article/10.1023/A:1006824100041

Markussen, T., Fibæk, M., Tarp, F. & Tuan, N. D. A. (2018). The Happy Farmer: Self-Employment and Subjective Well-Being in Rural Vietnam. *Journal of Happiness Studies, 19*(1), 1613–1636. doi: 10.1007/s10902-017-9899-1

Pandey, S., Rosegrant, M. W., Sulser, T. & Bhandari, H. (2010). Rice Price Crisis: Causes, Impacts, and Solutions. *Asian Journal of Agriculture and Development, 7*(2), 1-15

Punongbayan, J. C. (2019). *"[ANALYSIS] Will Rice Tariffication Live up to Its Promise?"* Rappler. Retrieved from

www.rappler.com/thought-leaders/218393-analysis-will-rice-tariffication-live-up-to-promise.

Santiago, D. (2019). *Philippines Rice Imports by Country*. Retrieved from http://www.philippinesaroundtheworld.com/philippines-rice-imports-by-country/

Sarmiento, K. I. (2011). *The subjective well-being of landless farm families: An individual to family level approach*. Unpublished Thesis, CLSU, Science City of Munoz, Nueva Ecija, Philippines.

Schiffrin, H. H., & Nelson, S. K. (2010). Stressed and happy? Investigating the relationship between happiness and perceived stress. *Journal of Happiness Studies: An Interdisciplinary Forum on Subjective Well-Being, 11*(1), 33-39. Retrieved from https://doi.org/10.1007/s10902-008-9104-7

Stock, J. H. & Watson, M. W. (2007). *Introduction to Econometrics.* 2nd edition. Boston: Pearson Addison Wesley.

Tobias, A. M. (2019). The Philippine Rice Tariffication Law: Implications and Issues. Food and Fertilizer Technology Center-Agricultural policy Platform. Retrieved from http://ap.fftc.agnet.org/index.php

Villano, R. & Fleming, E. (2006). Technical Inefficiency and Production Risk in Rice Farming: Evidence from Central Luzon Philippines. *Asian Economic Journal, 20*(1), 29-46. Retrieved from

https://doi.org/10.1111/j.1467-8381.2006.00223.x

Williams, R. (2016). Understanding and interpreting generalized ordered logit models. *The Journal of Mathematical Sociology*, *40*(1), 7-20. doi:10.1080/0022250X.2015.1112384.

Yagos, R. M. & Demayo, C. G. (2015). Farmer's perceptions on rice production management practices in Bayog, Zamboanga Del Sur, Mindanao, Philippines. *Journal of Scientific Research and Development, 2*(14), 96-101. Retrieved from https://www.researchgate.net/publication/305956405