

Factors Affecting Price of Cambodian Rice

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Abstract:- The purpose of this paper intends to identify and analyze the non-price factors affecting price. The food aid allocation programs depend on monetary values. The World Red Cross need monetary for supporting its program. The global food aid agencies will not meet their rice need for using in feeding program without a substantial increase in funding when rice price rise or the same amount of funding will buy less rice. The driving forces behind the price changing are the global food crisis which has not identified completely. The higher price is important factor to stimulate the higher production and the increase in price has significantly impacted on consumers both responding to the change in their price. Rice has been used as a sample being studied in Cambodia. Researcher gathered the annual data from the websites and the authority institutions (2005 to 2017) and interview with qualified person, millers, and farmers who living in Cambodia to gain knowledge and information about the rice price factor and the non-price factors. The statistic science test results indicated that both factors rice price and non-price have related. The non-price factors have explained the rice price change. The findings have fulfilled the previous gap. The model can estimate the rice price change and to use for managing those non-price factors effectively, efficiently.

Keywords:- Cambodian rice price; Harvested area; Paddy product; Population size.

I. INTRODUCTION

Many researchers have focused on the factors affecting prices including (Sklenicka et al., 2013; Hermawan et al., 2017; Henning & Jennifer, 1998; Dirgasová et al., 2017; Surya et al., 2018; Kyou, 1971; Nurul Hossain & Monir, 2012; Brummett, 2000; Nongnooch, 2014; C., 2009; Sushil et al., 2001; Michael, 1995; Sofia et al., 2014; Nathan & James, 2009). The prices relate to all goods and services. The change in prices have been influenced by many factors and there is positive impact, negative impact. When prices are increasing the same amount of funds can buy the less quantity products. It has connected with price rise; the United Nations World Food Program has announced the aid agencies are running out of money (funding shortages). Twenty million people don't have enough food to eat. Children are dying and millions are on the brink in what is the world's most acute humanitarian crisis (UNWFP, 2020). This study has found the evidences behind the price increase issues by identifying Paddy product, Harvested area, Population size, and Income influence Cambodian rice price. To analyze this framework the study has proposed the regression model and used SPSS software program to examine the rice price changes. In other words, this study has determined and

analyzed the four factors have drove the price change. The most concerns of this study are the prices (rice price) and the population size will be continued increasing while the harvested area does not hope to be continued increasing in the future. In addition, the shift in rice planting systems from transplanted to direct seeding is ongoing and expected to intensify as production resources such as rural labor and water, particularly in Asia, become scarcer (Alvaro et al., 2018). The previous empirical studies in Cambodia indicated that paddy product, harvested area, population size, and income have increased every year. The contribution of this paper has been expected to be better understanding in those factors influenced Cambodian rice price.

II. LITERATURE REVIEW

A. Factors Affecting Price

Price is a simple and common word which people in the world has heard and seen all the time, where the life needs. Everyone concerns with price and everything relates to price. Hermawan et al. (2017) found the factors affecting the domestic price of rice in Indonesia including Rice production (Paddy production), Exchange rate, International price of rice, and Income (GDP per capita). Sklenicka et al. (2013) found the factors affecting farmland prices in the Czech Republic, in that article's keywords there are Agricultural land conservation, Land management, and Soil quality etc. Alvaro et al. (2018) found the implications of red rice on food security, in that articles' keywords had focused Rice, and Food security etc. Sklenicka et al. (2013) found an economic analysis of rice prices in the Republic of Korea including Income, Farm price of rice, and the use of rice etc. And many authors have tried to map these factors and to quantify the strength of their impact on the price formation (Dirgasová et al., 2017). Dirgasová et al. (2017) argued that, there are many publications that analyzed the dependence of land prices on political, economic, legal, geographic, environmental and social factors such as farm income, population, credit availability and property tax rates (Devadoss and Manchu, 2007), land type (Feichtinger and Salhofer, 2013), productivity, parcel size, distance to large cities, population density and income (Huang et al., 2006), plot size, interest rate and the support payments (Latruffe et al., 2008), land quality, infrastructure and structural changes in agriculture (Pyykkönen, 2005), growing housing demand and infrastructural expansion (Swinnen et al., 2009), government payments (Vyn, 2006), farm production and government subsidies (Weersink et al., 1999). In general, there are two types of agricultural land prices: market prices and administrative prices. For the purpose of this paper, these prices will be referred to as supply prices. These authors had concerned the price of agricultural land in Slovakia and the

results of their study have the $R^2 = 0.2139$ with the number of observed = 5356.

B. Price and Cambodian rice

The Cambodian rice means the cereal nut which husked from paddy by using machine or other tools to crush. The Cambodian people and many people in the world, especially in Asia country take rice as their staple diet food. The price of Cambodian rice is referred to the price which exchanging for the money with the rice between consumer and seller at the Cambodia local market. Cambodian people who live in the cities and in the provinces buy rice at the supermarket and at the general market for daily staple food, excepted some families get rice from their relative who live at rural farm. The other families get rice from their own farm by exchanged labor. Noted that, nowadays in Cambodia, occasionally, at the ceremony or at the picnic, people have meat, noodle, potato, and vegetable, substitute for rice. Other words, rice shall be not eaten much at the holiday, then it has still in stock than usually day. The rice price in the local nowadays was not critical for the high-income families, but it's crucial for the middle and the low-income families in the local as well as in some part of the world who had no farmland. The dilemma of rice price is that, the consumers want the low rice price and the government policy's makers also want the low rice price to compete with other exporting countries or to sell at international market, but farmers and millers want high price for their profits. Price of Cambodian rice has been surveyed by Ministry of Commerce in local market and published monthly and yearly. Please refer to Fig. 4 for the price and the Cambodian rice.

Fig.4. Price and Cambodian rice



C. Paddy product

The term for the paddy product in this study is not rice product please refer to Fig. 5. The paddy product in Cambodia has been increased every year. It is different from previous research in other countries had shown that the paddy product did not increase. Historically, economists and policymakers tend to undervalue this type of research since yield potential is not increased (Alvaro et al., 2018). Paddy Products referred to the products were harvested after transplanting in the water on farm soil surface around 3 to 4 of month by farmer in Cambodia. The paddy product amounts reflected the technology adoption and reflected the number of producers. Paddy product is the supply shifter. In

some area of Cambodia, the paddy product has been growing at least two-time a year. The paddy product growth has contributed to the change of rice price. The price of paddy product synchronizes closely with the price of rice in the market, both local market and international market. Paddy product is the source of Cambodian farmers' income, because of the job of farmers are farming on their own farmland and sell the surplus amount of paddy product to have money for paying interest of the bank debt, for paying of children school fees, for paying input cost of production such as seed, fertilizer, pesticide, fuel, engine, and for the labors. In the history of Cambodian people, some farmers sell almost of their paddy to pay the items above. The farmers and millers closely communicated than paddy brokers and rice consumers, so that, before farmers sell paddy product, the paddy product must be crushed as rice to gain a good price. Paddy product in this year will be affecting price of rice next to year. Paddy product has been published the data and information yearly and monthly by Ministry of Agriculture, Forestry and Fisheries. Please refer to Fig. 5 for the abstract picture.

Fig.5. Paddy product



D. Harvested area

The harvested area in this study is the area for harvesting the paddy product which planted in the farm soil surface. Regarding to mine clearance plan in land of the Royal Government of Cambodia, it was not only the tourist place and the living land area but also land areas for agricultural are expanded each year. The agricultural land areas are the important input resource for economic development of Cambodia. The policy stability in the Kingdom of Cambodia is the one of five pillars in the core value of economics, why? Because, due to the concrete policy stability the investors satisfied to invest their money in agricultural land for planting the paddy and some areas were converted to land for building or land for industrial. Other words, some farmers sell their farmland for money to buy land in another area and keep some money to invest in other aims, in this situation the price of land has risen steadily from year to year. These transactions concerning with the agricultural land area which shall be eroded from the year, even the mine clearance plan was expanded the agricultural land area. The harvested areas are important for growing more paddy product, while the population and price of rice continue to increase. Harvested area is a major part of

agricultural land areas have related with the price. Harvested area is an input resource which related to price and to be a supply curve shifter. In the statistical data indicated that harvested area had correlated with rice price around 89 percent. The other words, the size of harvested area has reflected the amount of rice supply which concerned with its price. A story, when rice price continues to decrease, the farmers sold their farmland or left it and find a job in the city. On the other hand, when rice price continues to increase, the investors invest in farmland. Due to the agricultural land area has the limited number, the expanding ability of harvested areas have limited, too, even the rice price was high. Harvested area has been published the data and information by Ministry of Agriculture, Forestry and Fisheries, yearly and monthly. Please refer to Fig. 6 for more information about the agricultural land area which had been eroded from year to year.

Fig.6. Harvested area



E. Population size

Population size referred to the Cambodian national census by Ministry of Plan and other valid sources including UN and world bank which written about the world population. Due to the Cambodian people size have increased from year to year the demand and the quantity demanded for rice shall be forecasted changing, too. The population size increase had reflected the number increasing of rice consumers, even this research study did not separate the young and old. The increase number of Cambodian people shifted the demand curve for rice to the right, this even should be pushing price of quantity demanded for rice up, while the supply of rice keeps the same existing pace. Cambodian people have spent some of their income for rice price every day as in statistic data indicated that population size had been correlated with rice price around 86 percent. The rice consumers or demand for rice in the globe had been forecasted that increased every year. The population size has been published the data and information in each five-year plan by Ministry of Planning. In addition, Department of Economic and Social Affairs, Population Division of United Nation has launched the data and information of world population in its website. Please refer to Fig. 7 for the abstract picture.

Fig.7. Population size



F. Income

The Income referred to GDP per capita for Cambodian people. In economics, the income is one of those factors which shifts the demand curve, or it is the demand shifter. Regarding to GDP per capita the income of Cambodian people has increased each year. A part of this income has been spent for rice price every day. When rice price stays the same, the rice consumers feel rich, while their income increasing, even small amount of income spent for price of rice, because they still have some money to save or to buy anything else. On the other hand, when price of rice increased a little bit, the rice consumers feel sad or feel poor, even their income increasing, especially, the low-income families. The rice consumers want low price of rice and rice suppliers want high of rice price; this is general norm. Even the price of rice stays the same or continue to increase, Cambodian people still buy rice for their staple food diet. Cambodian people do not have trend to substitute any food for rice nowadays, even their income increasing every year (excepted for holiday time or picnic time or ceremony time). Income has been forecasted and published the data and information in each year plan by Ministry of Economy and Finance. In addition, World Bank has launched the data and information of world population Income in its website.

III. MATERIALS AND METHODS

When demand increased, and supply remains unchanged, then it leads to higher price and higher quantity demanded, on the contrary, if demand decreases and supply remains unchanged, then it leads to lower price and lower quantity demanded. When supply increased, and demand remains unchanged, then it leads to lower price and higher quantity supplied, on the contrary, if supply decreases and demand remains unchanged, then it leads to higher price and lower quantity supplied. The study has found out the issues of different perspective authors dealing with the factors affecting prices. Regarding to the evidences above and based on the economic factors in Cambodia, the study has selected and determined four variable factors including Paddy product, Harvested area, Population size, and Income affecting price of Cambodian rice. The sample size and the analysis model for the study has referred to the previous authors including (Hermawan et al., 2017; Dirgasová et al., 2017; Surya et al., 2018; Uma & Roger, 2013; Jeffrey, 2012).

Thereby the equation (1) of price of Cambodian rice used in this study is written as

$$PCR = a + b_1PP + b_2HA + b_3PS + b_4I + \mu \quad (1)$$

Where,

PCR = Price of Cambodian rice

PP = Paddy product

HA = Harvested area

PS = Population size

I = Income

The static multiple regression model, we can hope to estimate, for example, the ceteris paribus effect of an increase (or decrease) in any variable on dependent variable by using annual data which were gathered from Ministry of Agriculture Forestry and Fisheries, Ministry of Commerce, Ministry of Planning in Cambodia and the websites during 2005 to 2017. The equation of price of Cambodian rice also has been used to examine the Pearson correlations (Pearson, r) both dependent variable and independent variables by using SPSS Statistics 21 for calculation.

IV. RESULTS AND DISCUSSION

➤ Factors affecting price of Cambodian rice

Many authors have tried to map the factors and to quantify the strength of their impact on the price formation (Dirgasová et al., 2017). This study has determined the factors affecting price of Cambodian rice based on the Cambodian economic activities, on existing reports and books, on the issues of previous authors, and trend analysis has been shown in Fig. 1. Fig. 1 had shown all variable factors increased from year to year, by comparing from the basic year 2005 through 2017. The equation (1) of price of Cambodian rice was converted to equation (2) and was estimated using ordinary least squares regression and annual data from year 2005 to 2017. The equation (2) of estimated regression model is:

$$PCR = - 4573915.88 + 0.730PP - 0.599HA + 0.288PS - 0.549I$$

The results for equation (2) of estimated regression model has shown in **TABLE I**.

Based on the results of autocorrelation test using Durbin-Watson Test (DW) in SPSS Statistics 21 software program the DW was calculated at 1.025 for the equation (2) of price of Cambodian rice. Referring to the Durbin-Watson Statistic Table A-2 at the 5 percent significance points of dL value is 0.574 and dU value is 2.094 for $n = 13$ and $k = 4$, the DW test value (1.025) lies between the value of dL and dU it is decided not reject the null hypothesis of zero autocorrelation in the residuals. Other words, the study concludes that autocorrelation in the residuals from the estimation did not have a problem. if the time series variables in the equation are cointegrated a stable long-run relationship can be estimated using standard ordinary least squares without obtaining spurious results (Nurul Hossain & Monir, 2012). The residuals came from the estimation of PCR which

have zero autocorrelation mean are presented in Fig. 2 at the bottom line.

Based on the results of heteroskedasticity test using Breusch-Pagan Test (BP) in SPSS Statistics 21 software program the BP was calculated at 0.154 for the equation (2) of price of Cambodian rice. The value of BP test is $F(4, 8): 2.244$ with p-value equal to $0.154 > 0.05$ ($\alpha = 0.05$) has been interpreted that the explanatory variables are not affecting the residuals. Other words, the research study fail to reject the null hypothesis which assumes that, H_0 : The residuals are normally distributed.

The results of normally distributed data test using Shapiro-Wilk test (W) in SPSS Statistic 21 software program was calculated at $W: 0.785$ (df: 13), P-value: $0.005 < 0.05$ ($\alpha = 0.05$) with Skewness: -1.014 and Kurtosis: -0.632. These values are not outliers and did not impact on the purpose of analysis. In addition, the Fig. 3 has shown the graph as the evidence for Shapiro-Wilk test. Based on the results in TABLE I the study concludes that the data are normally distributed.

The determination of adjusted R Squared (*Adj. R²*) value from the R Squared value at 0.907 obtained from the data processing results shown in TABLE I is 0.861, meaning that around 86 percent of the price of Cambodian rice could be explained by Paddy product, Harvested area, Population size, and Income, while around 14 percent is explained by other variables outside of the independent variables. To determine the effect of independent variables simultaneously on the dependent variable price of Cambodian rice is done by ANOVA Test (*F-Ratio*). Based on the results of data processing, it was found that *F-Ratio* in TABLE I was 19.586, it can be concluded that the Paddy product, Harvested area, Population size, and Income together have a significant effect on Price of Cambodian Rice.

The results of t-test in TABLE I, the ratio for each independent variable show that the paddy product has a positive sign and significantly influenced the price of Cambodian rice. The harvested area has a negative sign but not significantly influenced the price of Cambodian rice. The population size has a positive sign but not significantly influenced the price of Cambodian rice. The income has a negative sign but not significantly influenced the price of Cambodian rice.

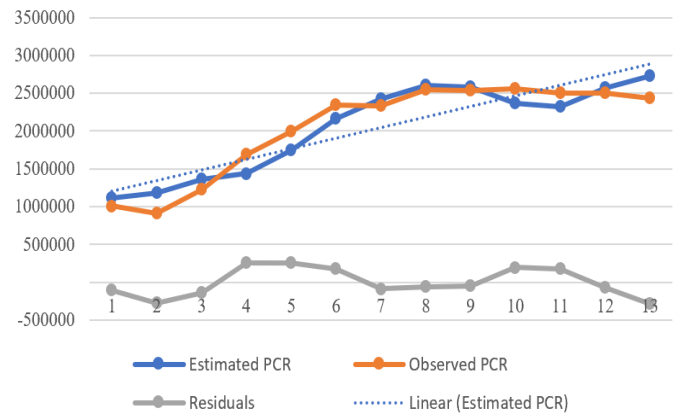
Regarding to the ceteris paribus conditions the study concludes that, if there is an increase in paddy product by 1 percent the price of Cambodian rice increases by 0.730 percent (elastic), if there is an increase in harvested area by 1 percent the price of Cambodian rice decreases by 0.559 percent (elastic), if there is an increase in population size by 1 percent the price of Cambodian rice increases by 0.288 percent (elastic), and if there is an increase in income by 1 percent the price of Cambodian rice decreases by 0.549 percent (elastic).

TABLE I. Model Summary: Price of Cambodian Rice
Estimated Model

Model	Unstandardized Coefficients		t	Sig.
	B	Std. Error		
Constant	-4573915.888	9135911.540	-0.501	0.630
PP	0.730	0.257	2.845	0.022
HA	-0.599	2.082	-0.288	0.781
PS	0.288	0.901	0.319	0.758
I	-0.549	0.555	-0.989	0.352
Adj. R ²	0.861			
F-Ratio (4, 8)	19.586			
P-Value	0.000 ($\alpha = 0.05$)			
Pearson, r	0.953			
DW	1.025			
BP	0.154			
W	0.005			
Skewness	-1.014			
Kurtosis	-0.632			

- Cambodia Agricultural Market System, MAFF
- Annual Report for Agriculture Forestry and Fisheries, MAFF
- Department of Economic and Social Affairs, Population Division, UN
- Data from world Bank

Fig.2. Observed PCR vs Estimated PCR (2005-2017)



V. CONCLUSIONS

This paper has proposed the price estimated model in Cambodia and based on the science statistic test results with using several methods to modify those results, the research study concludes as followings:

The non-price variable factors including Paddy product, Harvested area, Population size, Income, and price of Cambodian rice have been strongly correlated with each other and the regressors have jointed to explain price of Cambodian rice model around 86%. This model should be used to estimate the price of Cambodian rice for two purposes: one is to manage those economic factors effectively and another one is to rice price projection for the future perspectives.

The critical contribution of this research study has proved the findings for non-price factors influence price of Cambodian rice. Paddy product and Population size have a positive coefficient, while Harvested area and Income have a negative coefficient in the price of Cambodian rice model and these four non-price variable factors have the elastic manners. The decrease or the increase of product prices has depended not only the cost (price factors) but has been influenced by the non-price variable factors which strongly correlated with price of that product “price of Cambodian rice change is influenced by price factors and non-price factors”.

In addition, this research study understands that, low-income families, policymakers, and producers are the key role actors in the dilemma of prices.

Fig.3. The using graph evidence for Shapiro-Wilk test

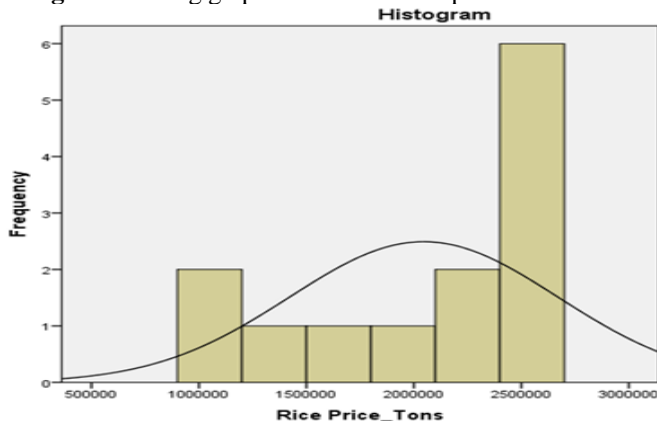
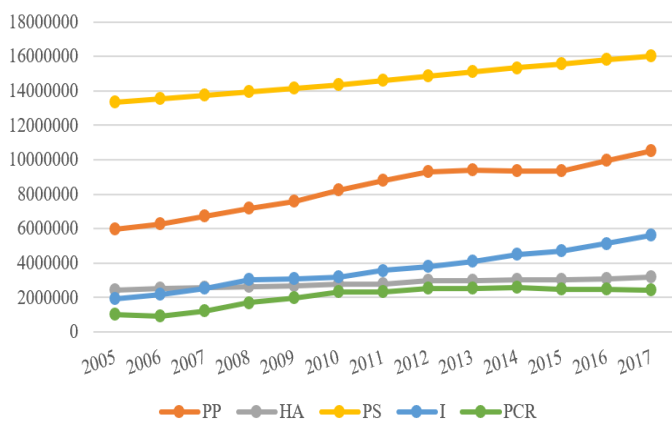


Fig.1. Trend analysis of PP, HA, PS, I, and PCR for average year data



Source: - Official Notices, Ministry of Commerce

DECLARATION OF INTEREST

The author declares that, the conflict of interest: none. This research paper did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sector. Errors and omissions, if any, is the authors' sole responsibility.

ACKNOWLEDGMENT

I am gratefully to the anonymous editors and reviewers who recommended and sincerely thank for Dr Ly Sok Heng, Dr Kang Sovannara, Dr Poch Bunnak, Dr Phou Sambath, Dr Sok Seang, and Dr Nhem Sareth.

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