

The Nexus for Progress of Rice Market GDP in India, China, Indonesia, Vietnam and Bangladesh

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Abstract: This research explores that how rice whether it is consumption or production has a greater impact on the growth of the Gross Domestic Product (GDP) over the 1990-2019 sample period in China, Bangladesh, India, Indonesia and Vietnam. Empirical findings suggest rice yielding has a greater impact on GDP growth than rice consumption. The root test unit of Philips-Perron shows GDP development of the sample countries is stationary in number of cases related to rice production, whereas Indian and Indonesian demonstration of rice production are only stationary at the same level. and first alteration, others demonstration inactive at initial change. In both level and first difference, only Vietnam and India exhibit stationary for rice production, although others appear stationary in initial change. After evaluating Granger Causality and decomposing variance, the results show that China's bidirectional Granger causes relations, and that Vietnam reveals that preemptive Granger causes connections. Yet all variables are clarified by one another, excluding the association between rice feeding and rice creation.

Keywords: Rice, paddy field, Gross domestic Product (GDP).

1. Introduction

To several Asian countries such as China, Japan and India, rice has become a staple meal, and rice has been in daily dietary need in many countries of to thousands of years. 91 per cent of rice is grown in Asia in 2006 until 2010, and since the early 1960s this has remained unchanged. Outside Asian nations, Madagascar, Sierra Leone, r, and Liberia in West Africa plus Guyana, Suriname, French Guyana, and Panama in Latin United states of America have been the only nations whose rice accounted for over 40 % of the overall crop zone produced. But still Madagascar, Cameroon, Sierra Leone, Senegal, and Cameroon-Bissau, seem to be the nations that contribute to rise by additional than 35% of caloric consumption. The per capita intake in Asia in the early 1960s demonstrates a continual increase from 82 kg/year to almost 104 kg/year in the period 2017 (Fig.1). Global per capita rice consumption has increased from 50 kg/year to 66 kg/year over the same time (Fig. 2) [1].

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The five largest rice producers as well as the countries of consume are Vietnam, Bangladesh, India, China, and Indonesia. In February 2016, biennial rice production in Bangladesh, India, China, Indonesia, as well as Vietnam contributed to 144360, 104700, 35460, 34400, and 28134,000 metric tonnes (Fig3). The rising pattern in Asian per capita rice feeding as customers has been since the early 1990s differentiated their food from rice to high level-worth foods, example, meat, vegetables, and fruits have also remained stopped by individuals positive developed countries in Asia like emergent nations. In Asia, per capita rice consumption decreased from 103 kg to 96 kg from 1992 through 2005. In recent years, the declining tendency in per capita rice consumption has been upturned, and per capita consumption has begun to rise again, despite a decreasing tendency in per capita indulging in big nations such as India, China & Indonesia, between 1992 and 2005 (Fig.4) [2].

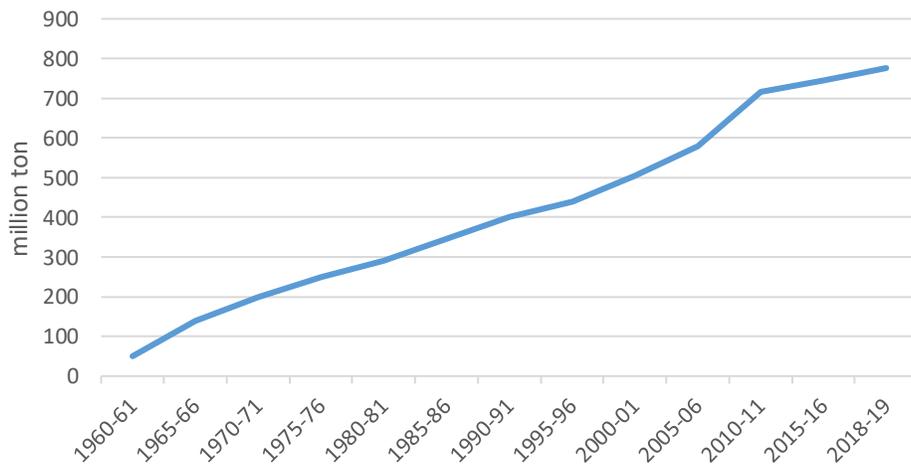


Fig.1 Total Global Rice Consumption between Years 1960 – 2019 in Million Ton Based On the Production in Major Asian Countries

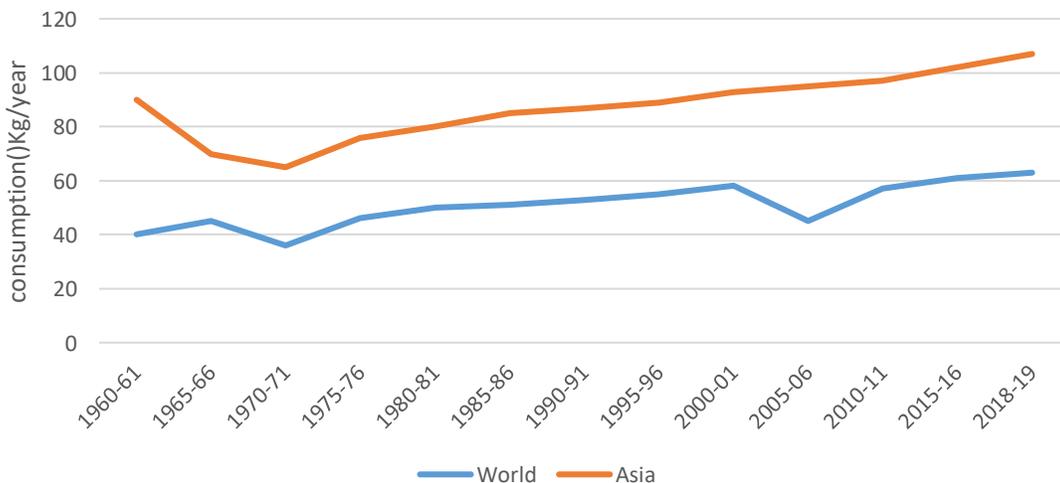


Fig.2 Comparison and Difference between Global and Asian Rice Consumption between Years 1960 – 2019

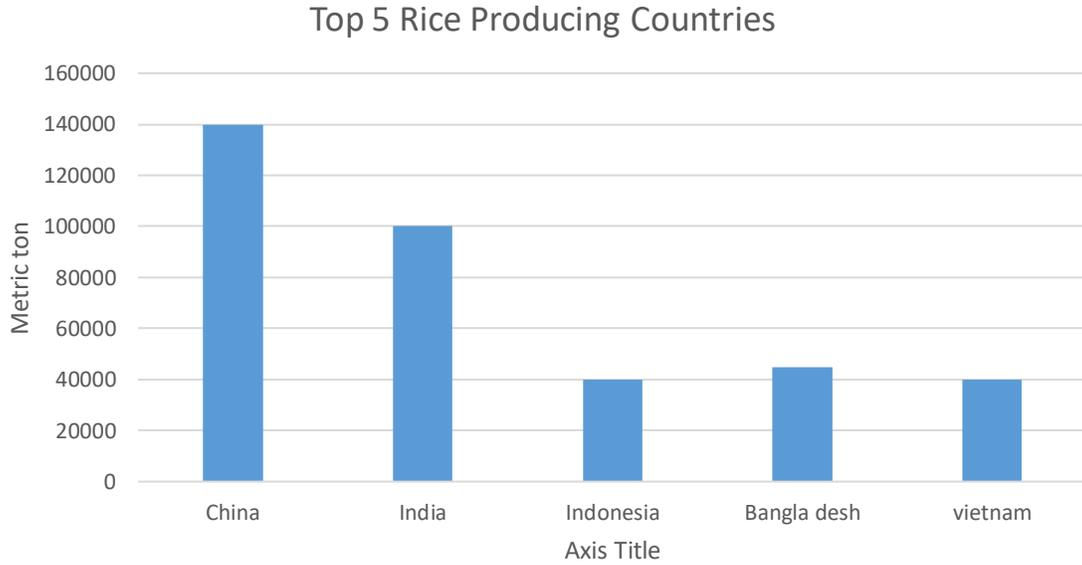


Fig.3 Top 5 Rice Producing Countries among Major Asian Countries between 1960- 2019

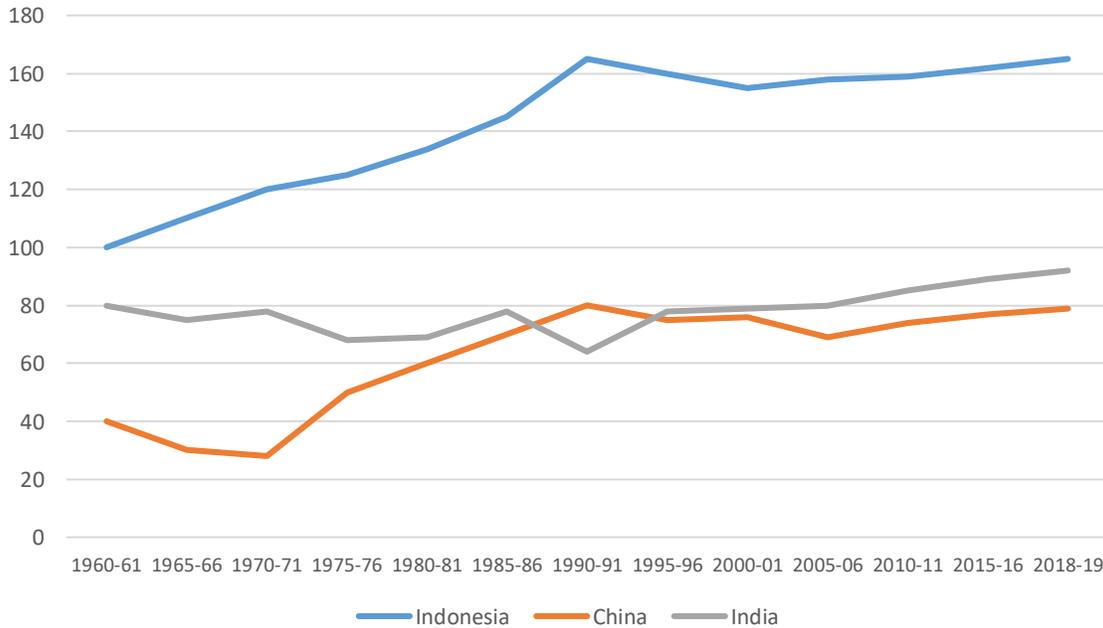


Fig.4 Per Capita Consumption of the Rice on the Basis Accumulation Production between Years 1960 - 2019

Asia's population determination spread through 2025 almost 5 billion, and by 2055 5.25 billion, according to population projections by the United Nations in 2010. If the current upward tendency in per capita utilization in India, China & Indonesia total consumer spending may even exceed population growth. Rice consumption and manufacturing will affect GDP. It has been indicated that consumption of the rice production will affect GDP. It will also increase the GDP for the country[3].

2. Literature Survey

The traditional Chinese culture is depending upon rice in a big way therefore it might be measured a "rice culture" since the Chinese people had cultivated their land for a few centuries. Many facets of ancient China had been powerfully effected by rice and had long focused on rice [4].

China:

World's largest producer of rice, since it has long been such a powerful agriculture industry. Except for rice, many other plants are planted in China as well. This is because China does have the resources, lands and climate necessary to generate these crops, specifically rice [5].

Rice has also been harvested throughout ancient times, mainly from around southern region due to global warming, water quality and soil fertility, as stated earlier. In high temperatures and sufficient rainfall, rice grows best although it still requires irrigation. Nonetheless, due to low temperature increases, uncommon rainfall and so on, the northern part of China produces another form of rice (International Rice Investigation Institution 2018). It indicates the portion of rice grown areas [6].

Next, China also clamps the top spot in rice consumption regarding rice consumption in China. Rice comprises two-thirds of the Chinese's basic diet and can therefore be found in most Chinese restaurant menus, with the Chinese tradition as the main reason behind it. Rice has also continued to function from prehistoric times, other than eating with several other meals. For ex. Glutinous rice can be wrapped in bamboo leaves to produce zongzi in which Chinese eat annually to commemorate the Dragon Boat Festival, and rice can also be fermented for rice wine harvesting. Rice devours have been a part of Chinese history, and that is the main reason why China's rice intake is the largest in the world. [7].

India:

Rice has been cultivated in India since ancient times. You can find the proof of the statement from the text of Yajur Veda, where rice was first mentioned. The Indians have such a thinking that the grated potatoes should really be comparable to friends but not tied together. People also have faith in that rice is a symbol of wealth as well as fertility. Through these claims, we could see that rice plays a significant role in Asia except as a basic food source for people [8].

India, being the additional main country in rice production as well as consumption, achieved this ranking for many reasons. Firstly, India's climate is tropical monsoon for development, ensuring that they can get adequate rainfall for rice cultivation. Second, the labor-force. India is the one of the most populous nation and it's a developing country. According to data from the International Rice Research Institute (2018), 18% of the nation's GDP derives as of agriculture, yet consumption in this sector is about 52 percent of the nation's workforce. [9].

Next, India is known as a poor country for consumption Fig.5 and most developed and affluent countries depend on rice as their main source of food. Rice can also be seen to be the primary food for more than 50% of the nation's total population. (International Rice Investigation Institution 2018). Eating rice has been a tradition for the people of India because of the rice that has been grown since ancient times [10].

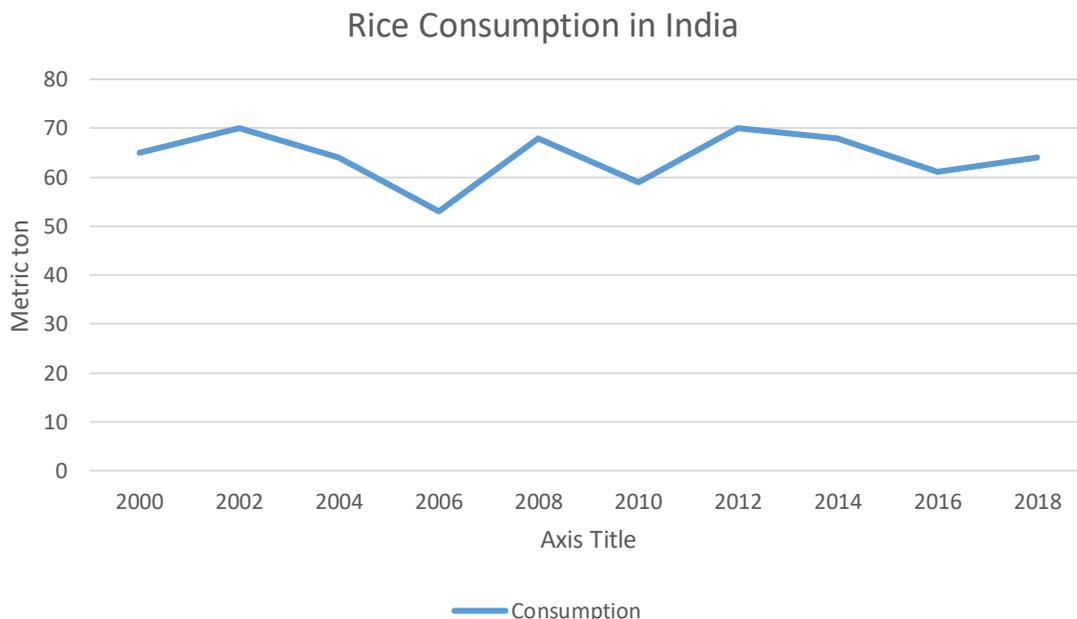


Fig. 5 Rice Consumption in India between Years 2000- 2018 on the Accumulation of Production of Rice in All States of the India

Indonesia:

Rice is a critical commodity that has a profound effect on Indonesia's social, cultural, rural, political and employment issues. It is one of the highly significant essential food for the people of Indonesia and donates to rural development in Indonesia as an integral factor. It occupies a central position in Indonesian culture and cuisine. As far as employment is concerned, the rice sector plays a leading role in producing employ which involves about 21 million households in the production of rice [11].

Indonesia is renowned for having the third uppermost rice production in the world. Nevertheless, as shown in Fig.6, it is used by 93% of its population. Indonesia spends large amounts on importing rice to meet a high demand for rice, which is unbalancing its economy. There was a trade deficit when imports were bigger than exports. As a result, Indonesia's GDP has shrunk [12].

Bangladesh:

Bangladesh is the world's fourth-biggest rice manufacturer. In that sovereign country there are about 234 rivers, and a total of 24,140 miles of great rivers flowing through country, low, smooth, and fecund land. Because Bangladesh follows a temperate tropical monsoon, the strong slit accumulated in the rivers during the rainy season by intermittent flooding is continuously intensifying the alluvial soil. Yet 70% of the land consists of agriculture in resources (International Rice Investigation Institution 2018) [13].

The harvested rice area increased from almost 10,000,000 hectares in 1995 to almost 12,000,000 hectares in 2010. given the arable land decline in Bangladesh in 1971. In Bangladesh rice harvest also risen from 0.235868032 kg / m² in 1995 to nearly 0.390089438 kg / m² in 2015. Rice production is almost reduced by the increase in the cultivated area of rice from over 26 million tons in 1995, to 50 million tons in

2017. Bangladesh has an inhabitant of nearly 149 million and rice is their staple food. In 2009 the annual intake of milled rice was 0.1733 tons. In Bangladesh rice production has increased over several years, with rice consequences decreasing from around 1 million tons in 1995 in 2009 to just 17 kg, but slightly up to 0,66 million tons in 2018. (International Rice Investigation Institution 2018) [14].

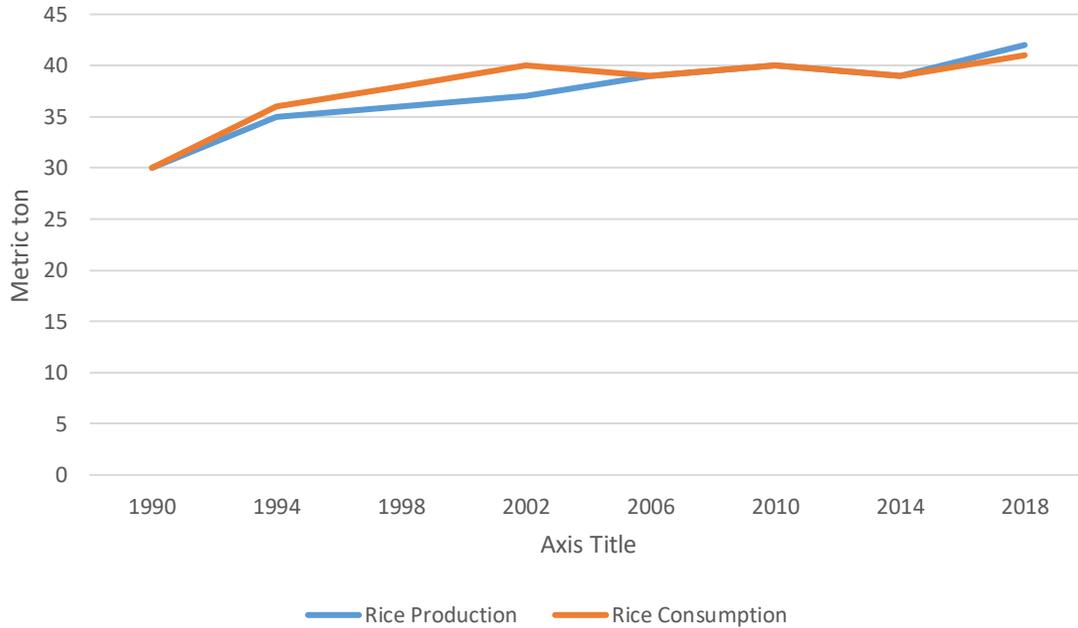


Fig. 6 Rice production and consumption in Indonesia

The United States Agency for International Development (USAID), the International Development Research Center (IDRC), the Asian Development Bank (ADB), in Canada, or the Rockefeller Foundation funded efforts by the International Rice Research Institution (IRRI) to help Bangladesh resolve the insufficiency of rice in 1970. The initiatives were committed to improving farming practices around the world crop patterns, controlling soil, nutrients, insects, insect pests as well as mechanizing farming.

The population continues to increase and contributes to the difficulties in supporting the level of rice production. For example, drought, floods, and less resources make it difficult to sustain their production at the same rice production level. The government consumes introduced most important rice policies to upsurge making as well as reduce imports but to regulate domestic rice prices, they have still imported some rice. For example, the government has provided aid, cash subsidies for small and marginal farmers [15].

Vietnam:

Rice is an important agricultural product for satisfying the food security of 89 million Vietnamese. Vietnamese rice demand is advanced than other countries Furthermore, the rice market can be employed by export and delivery to boost economic growth. 60% of the country's labor force with job opportunities. The population rose from 2005 to 2010, based on the estimates. The population was approximately 87

million in 2010. The total labor force in the country was over 47 million, with over 50% of its residents engaged in agriculture [16].

Production of rice has risen significantly over the year. The total output expanded from 14000000000 Kilogram in 1996 to almost 32000000000 Kilogram in 2017. This is thanks to technological advancement, sufficient nitrogen and in recent years, the land used for rice planting has developed under cultivation leading to high yields. Red Delta River in the west and Mekong Delta River in the South with 1.2 million hectares of individual rice paddy and 4.2 million hectares., are the regions with the maximum cultivation of food. These two sites are suitable for rice planting due to the humid and tropical climate. It has been reported that rice production in Ghana has contributed significantly to GDP by 39.5 per cent. The policymaker had been paying attention to domestic rice production to reduce import dependency [17].

TROBLE STATEMENT

The important reason for chosen Indonesia, China, India, Bangladesh, and Vietnam is because of the issue of diet deficiency. Food shortages are an important global problem. China consumes reported that there is insufficient local production to meet indigenous demand. The country therefore necessitates that food be imported from other countries. Throughout the long run, China's economy will not only be affected, but the worldwide reduced will also be influenced by the increasing food prices [18].

The reason why we selected China, Indonesia, India, Vietnam, and Bangladesh as our specimens because they embody the maximum 5 rice purchasing and supply countries. From this it demonstrates that the financial barriers act a significant role in economic development of those countries. Rice industry is measured among the most significant trade units in the region, and is the extremely significant resource of employ & wealth for pastoral dwellers in developing nations [19].

3. Methodology

Design:

For this study, time series data of Output growth, agricultural productivity, and rice utilization were used for 5 countries between 1990 and 2018. The five nations are China, India, Pakistan, Vietnam and Indonesia. The information on rice production and distribution was in million tons, so it is readjusted it to a logarithm. All data was gathered from Bloomberg Servers.

Sample:

Group because test is implemented to identify the stationary or non-stationary time series component. When non-stationary values are observed in variables, the variable estimates can change over time. It will result in false findings which will trigger undesirable results. Unit root testing shall be carried out prior to cointegration testing. If it is viewed as non-stationary, a co integration test should be developed. In comparison, when the null hypothesis is dismissed, cointegration test can be removed.

Instrument:

Philips-Perron method is a non-parametric numerical method for adding the automatic adjustment to a DF cycle to allow correlated Auto Residuals. In addition, asymptotic distribution of PP tests is the same as the

results of ADF tests, which usually give the same inference as the ADF test. Therefore, as long as the outcome of the ADF test matches the outcome of the PP test, we can assume the same thing. In this analysis two models which are the continual model with a sequence and the continuous model are enforced.

Data collection:

The required data has been collected by the various government agency as well as local agencies along with NGO, who are working tirelessly in the field of agricultural for eradicating the problem of scarcity of good and have the common target to alleviate the problem of hunger and food shortage.

Data Analysis:

The data has been analyses for the Asian countries with the world data to find out the solution of the problem raised for the analysis. The Philips -Perron test method has been used to find out the best possible outcome.

4. Result and Discussion

The findings from of the Philips-Perron test. Besides Economic growth, both trend model and the constant model show that all sample countries, with the exception of Bangladesh, have a steady result at the level .At the first discrepancy of the constant model, Bangladesh's GDP growth is just stationary.

The rice developed for China, Bangladesh and Indonesia is observed to be affected by a level-shaped non - constant change, following the model with a linear relationship and model of steady and probabilistic pattern. Only Vietnam's results are stationary at the level form of the constant model and India's results are stationary at the level form of the constant and deterministic pattern. The consequences as of both versions demonstration stationary movement of rice outputs in China, Bangladesh and Indonesia for the series in the first difference type.

On the other hand, the constant term for rice consumption shows that China, Bangladesh Vietnam, and India are at initial modification just stationary. Consequences centered on the prototypical with a continuous period indicate that such mutable is stationary in the stage form for Indonesia. Since the consequences Reveal all factors to be motionless, there is no need to perform the integration test.

Dynamic Causation between Rice Utilization and GDP Expansion:

Demonstrating the outcomes of Granger 's causality and rice utilization patterns for 5 nations, such as China, Indonesia, India, Vietnam and Bangladesh. The results of the F-statistical value of the Wald test are concise as per the findings.

By looking at Vietnam's data, Granger's rice consumption triggers GDP growth at a sense point of 10 per cent. This finding suggests that GDP growth can be expected by past knowledge found in rice consumption. Rice has been regarded as an essential commodity in the past to meet the Vietnamese's food Security, and now it's a diplomatic plant that can earn billions of dollars annually via the exports. In more words, Vietnam's rice intake is cut instead of export purposes. Hence the export of rice influences Vietnam's GDP production.

As the matter discussed earlier, China, India, Indonesia and Bangladesh have no two-way connection amongst rice consumption and GDP growth to Granger causality. China's trend towards consumption has been shifting to meat based as per capita income increased. Good food is reasonable to consumers in the region. Consequently, demand for rice is slowly decreasing. Similar to India, the increase of urbanization has affected the lifestyles and food consumption of the Indian. Because the governments of China and Vietnam have adopted many policies, the strategy comprised DoiMoi rule in Vietnam, as well as the machine supports given by the authority of China. Such policies help to increase the rice production volume to promote economic development. Therefore, in China and Vietnam, the Granger causes the association between rice manufacture and GDP development.

Because their revenue and working hour have increased, the laborers are consuming more food outside. The Indian employee has not been able to cook typical meals such as rice, because it takes time. For the family's daily diet, consumption of ready-made meals is preferred. The consumption of rice thus has no effect on GDP growth. Although these two countries are the net importer of rice for Indonesia and Bangladesh, because Consumption of rice goes beyond its efficiency. Rice can only meet the everyday needs of the local citizen. That is because the bulk of their rural population is primarily engaged in the agricultural sector. They primarily eat rice, to be more competitive. As a result, GDP growth is not greatly impacted by this.

In addition, China displays the highest proportion of GDP rice consumption at 30, 8354%, followed by Indonesia, India, Vietnam and Bangladesh at 19,318, 4,1118, 23,1282 and 0,7162% respectively. China has the highest proportion of these nations, as China produces food waste through exclusive economic and cultural effects. Although Bangladesh's GDP shock has the lowest impact on its rice consumption of 0.7062 per cent. This finding is explained by the likely use by family members in Bangladesh of other goods and services, rather than rice purchases, since the price of rice in Bangladesh is very small. In 124 countries, the third lowest rice price of Bangladesh is the \$0.63perkg, according to Number (2017). This is because of the government's effort to alleviate rice values finished open market trades then 2005 and to deliver rice farmers with subsidy sustenance.

5. Conclusion

Two main results are focused on causality of Granger and decomposition of variances. To address the research question of how much rice consumption contributes to the sample countries' economic development, the first finding shows that the GDP development is triggered by Vietnam's rice consumption Granger. Nonetheless, the results of the disintegration of variances indicate that China, India, Indonesia and Vietnam have a spillover effect. The second result indicates that nearby bidirectional Granger which depends upon relationship between GDP rice production and growth in China to the degree to which rice production affects economic growth, although rice yield has a greater effect upon GDP development. Granger says GDP growth is boosting rice production in Vietnam. However, GDP growth and rice production have a spillover impact for, Vietnam Indonesia, India, and China.

Overall, each of ours results revealed that China, Indonesia, and India's big GDP are not conditional upon the rice marketplace used for it to expand. Developing countries do not rely on their agricultural GDP but are concentrated on industrial and service sectors. Indonesia's agriculture sector contributes greatly to their

GDP, but Indonesia's main commodities are rubber and palm oil. Also, between GDP growth and rice use and production, there can be no granger causality. Moreover, the effect of both the wheat production growth of rice is spillage for China, Indonesia and India, while GDP growth is caused by its huge population. Because the community is huge, rice production will be significant, and manufacturing will also enhance to meet indigenous demands, which in turn can cause spillover. For Vietnam's issue, while their demographic isn't as huge, the Vietnamese authority has introduced many policies to growth agricultural productivity as it will improve their GDP growth. For Vietnam, therefore, there is in fact a causal and insolvency relationship.

The result suggests a high-population country's rice production and consumption will affect its growth in GDP. It is, however, one exception to Vietnam, although its inhabitants are small. Hence, it advises the government will concentrate on the rice market to increase GDP growth. It is recommended that the sample countries strengthen their rice production methods by introducing successful rice-based policies and organizing public- and sector-wide efforts to help rice growth and exploration. For instance, the introduction of appropriations for strengthening bordering and minor farmers, as well as social capital. The government, instead, will enforce policies on rice to regulate rice consumption and rice imports. If costs are increasing for consumers, consumption will turn to replacing goods. Therefore, it is proposed that the government reduce subsidies for rice to the market and impose tax on introduced rice to minimize elevated rice utilization.

The limitation identified in this study would be that the data obtained instead of GDP development remains centered at an increasing scale is not categorized onto main, tertiary, and secondary sectors representing respectively the raw material, processing, and service. Regardless of this restriction, the results are not as revealing because it cannot be explained how much rice demand and consumption contributes to each of the sectors.

References

- F. Antwi, N. Fazylova, M.-C. Garcon, L. Lopez, R. Rubiano, and J. T. Slyer, "The effectiveness of web-based programs on the reduction of childhood obesity in school-aged children: A systematic review," *JBI Libr. Syst. Rev.*, 2012, doi: 10.11124/jbisrir-2012-248.
- M. Breitenlechner, M. Gächter, and F. Sindermann, "The finance-growth nexus in crisis," *Econ. Lett.*, 2015, doi: 10.1016/j.econlet.2015.04.014.
- U. C. Profile, P. Rights, and R. Governance, "Usaid Country Profile Property Rights and Resource Governance," World, 2010.
- G. Giraud, "The world market of fragrant rice, main issues and perspectives," *Int. Food Agribus. Manag. Rev.*, 2013, doi: 10.22004/ag.econ.148577.
- C. De Aenlle, "G.M.O. Dilemma: Swaying a Wary Public," *The New York Times*, 2015.
- I. Coxhead, V. H. Linh, and L. D. Tam, "Global market shocks and poverty in Vietnam: The case of rice," *Agric. Econ. (United Kingdom)*, 2012, doi: 10.1111/j.1574-0862.2012.00604.x.

- C. C. Chen, B. McCarl, and C. C. Chang, "Climate change, sea level rise and rice: Global market implications," *Clim. Change*, 2012, doi: 10.1007/s10584-011-0074-0.
- A. Sokhanvar, S. Çiftçioğlu, and E. Javid, "Another look at tourism- economic development nexus," *Tour. Manag. Perspect.*, 2018, doi: 10.1016/j.tmp.2018.03.002.
- V. Tyagi, "India's Agriculture: Challenges for Growth & Development in Present Scenario," *Int. J. Phys. Soc. Sci.*, 2012.
- D. J. Spielman, D. E. Kolady, and P. S. Ward, "The prospects for hybrid rice in India," *Food Secur.*, 2013, doi: 10.1007/s12571-013-0291-7.
- R. Caruso, I. Petrarca, and R. Ricciuti, "Climate change, rice crops, and violence: Evidence from Indonesia," *J. Peace Res.*, 2016, doi: 10.1177/0022343315616061.
- M. Kirchberger, "Natural disasters and labor markets," *J. Dev. Econ.*, 2017, doi: 10.1016/j.jdeveco.2016.11.002.
- S. Mardianto, Y. Supriyatna, and N. K. Agustin, "Dinamika Pola Pemasaran Gabah dan Beras di Indonesia," *Forum Penelit. Agro Ekon.*, 2016, doi: 10.21082/fae.v23n2.2005.116-131.
- P. Warr and A. A. Yusuf, "World food prices and poverty in Indonesia," *Aust. J. Agric. Resour. Econ.*, 2014, doi: 10.1111/1467-8489.12015.
- R. Al Fathan and T. Arundina, "Finance-growth nexus: Islamic finance development in Indonesia," *Int. J. Islam. Middle East. Financ. Manag.*, 2019, doi: 10.1108/IMEFM-09-2018-0285.
- International Rice Research Institute, "Disease- and pest-resistant rice," IRRI. 2013.
- A. O. Onyango, "Exploring Options for Improving Rice Production to Reduce Hunger and Poverty in Kenya," *World Environ.*, 2014, doi: 10.5923/j.env.20140404.03.
- W. David and Ardiansyah, "Organic agriculture in Indonesia: challenges and opportunities," *Org. Agric.*, 2017, doi: 10.1007/s13165-016-0160-8.
- F. Shiotsu et al., "Initiation and dissemination of organic rice cultivation in Bali, Indonesia," *Sustain.*, 2015, doi: 10.3390/su7055171.