Original Research Article

Causes and policy options of recent rice price hike in Bangladesh

Analysis of Rice Price Dynamics in Bangladesh: Causes and Policy options

Abstract

Rice availability and affordability are the key determinants of food security in Bangladesh. Therefore, it becomes the most important crop for the social and political economy of the country. Although a tremendous technological advancement contributed to the increasing trend of rice production, its affordability threatened due to the increasing price at the consumers' level. The recent natural calamities and COVID-19 have worsened the food security status across the world. This research has estimated the demand and supply of rice in the pandemic era and figured out the drivers of recent price hike both in the producers' and consumers' levels using empirical and cognitive approaches. Based on the findings, some actionable policy options have been suggested to address the price level of rice in Bangladesh towards sustaining food security.

Keywords: COVID-19, demand, food security, market price, rice disposal, supply.

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1. Introduction

Rice is the staple food in Bangladesh (Siddique et al., 2020; Siddique et al., 2017; Rahaman et al., 2020a; Islam et al., 2020; Rahman et al., 2021a) and the country ranks 3rd in the world in terms of the amount of rice production (Rahman et al., 2021b). The country has a long history of rice cultivation and contribution of rice to the livelihood of rural people is significant (Rahman et al., 2021c; Rahaman et al., 2021; Islam et al., 2021). Although Bangladesh has the highest average rice yield in South Asia (Salam et al., 2019), it is much lower (3.11 t/ha) than that of other leading rice-growing countries (Kabir et al., 2020; WRS, 2021). Rice is grown on about 11

million hectares which has remained almost stable over the past three decades in Bangladesh. About 75% of the total cropped area and over 80% of the total irrigated area is devoted to rice (Rahman et al., 2020; Rahaman et. al., 2020b). Total rice production in Bangladesh was about 10.59 million tons in the year 1971 when the country's population was only about 7.88 million. However, the country is now producing more than three times to feed her 170 million people (BBS, 2020). This indicates that the growth of rice production (2.83%) was much faster than the growth of population (2.04%). The increased rice production has been possible largely due to the adoption of modern rice varieties on around 66% of the rice land, which contributes to about 73% of the country's total rice production (Rahman et al., 2021b). The population of Bangladesh is still growing by two million every year and may increase by another 30 million over the next 20 years. The increased population would put pressure on the national food demand and subsequently total rice area will shrink. Rice yield therefore, needs to be increased from the present 3.11 to 4.05 t/ha (Kabir et al., 2020). It should be noted that sometimes rice farmers in Bangladesh fall into the price risk due to the market manipulation (Kabir et al., 2021).

Major rice initiatives have been undertaken by the government of Bangladesh in order to enhance supply and minimize imports (Ahmed, 2004). Subsidies are offered to rice farmers on a number of agricultural inputs in order to keep their prices within the farmers' purchasing power. Small and marginal farmers received cash subsidies from the government through an input disbursement card that can be used to get cash incentives for electricity and fuel for irrigation, fertilizer, and other government assistance (Tobias et al., 2012). The government has increased open market sales to keep rice prices stable at the retail level. Thousands of centers in district towns and union-level dealers around the country were able to sell rice at lower rates as a result of this program (In which programme rice dealers are open market sales source and year).

However, despite of bumper production, in most recent days, market prices go beyond the control that poses threat to consumers, especially to the low-income group. There is a scanty of insightful research that highlights on the recent rice price hikes in Bangladesh. But it is much important to figure out the causes of rice price hike in Bangladesh to take effective policy measures by the government. To do this, it is necessary to take a wholistic approach including the farmers and post production value chain actors of the rice value chain in Bangladesh. Therefore, the piece of this research was undertaken to find out the major drivers for rice price hikes in Bangladesh.

2. Methodology

2.1 Demand and supply estimation

The total rice demand was estimated by accounting for human and non-human consumption requirements per annum in Bangladesh using the formula and method from Kabir et al., 2020.

The total rice demand was estimated based on the equations below:

$$TRD_i = HC_i + NHC_i \quad \text{……………………………………………………….} (1)$$

Where, TRD is total rice requirement, HC is human consumption and NHC is the non-human consumption. Notably the human consumption was calculated from the form of milled rice for daily intake, puffed rice, flattened rice, pop rice, and in some extend making the cake (Table 1).

Table 1: Non-consumption usages of rice in Bangladesh

Sources	**Explanation**	**Percentages**
Seed	Farmers' recommended practices, field loss, damages of seed and additional safety for crisis period	1.52
Feed and other losses	Livestock, poultry and fish feed as well as usages of 'rice starch' in textile industries and tourists' consumption	5.15
Harvest operations	Harvest operations (cutting, field drying & bundling) and transporting from field to farm yard/threshing yard	5.20
Post-harvest operations	Threshing, winnowing, drying, in-store, out-	7.10

	store, transportation, marketing etc.	
Processing	Milling, over-polishing, storage and transportation operations	7.25[†]
Total non-consumption	Summation of all sources	26.22

Source: Adopted from the Bangladesh Rice Research Institute (BRRI). [†]Ratio of paddy to rice is 0.66 at government calculation but millers calculated at 0.60 rate based on head rice during processing which is considered in this calculation. There is difference of 0.06 which eventually affect national production of cleaned rice in Bangladesh.

2.2 Profitability equation

To determine per hectare profitability for each of the selected paddy farming from the viewpoint of individual farmers, the following algebraic equation has been used in Rahman et al., 2015 and Rahman et al., 2013:

$$\Pi_i = \sum Q_{yi} \cdot P_{yi} + \sum Q_{bi} \cdot P_{bi} - \sum_{j=1}^{m} (X_{ij} \cdot P_{xij}) - TFC_i \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where, $\prod$= Net returns from paddy (Tk/ha); Q_y = Total quantity of (paddy) outputs (kg/ha); P_y = Per unit prices of the paddy (Tk/kg); Q_b = The total quantity of the concerned byproduct (kg/ha); P_b = Per unit prices of the relevant byproduct (Tk/kg); X_i = Quantity of the concerned ith inputs; P_{xi} = Per unit price of the relevant ith inputs; TFC = The total fixed cost involved in production; $i = 1,2,3,\ldots,n$ (Number of farms); $j = 1,2,3,\ldots,m$ (Number of inputs).

In order to estimate the per kg production cost of paddy, the value of the straw has been deducted from the total costs of cultivation. Moreover, transportation, processing, and milling costs have been considered to estimate the production cost of clean rice in Bangladesh.

2.3 Data

The secondary data on total population, demand and supply of rice have been obtained from the Food Planning and Monitoring Unit (FPMU) of the ministry of food. The rice import data has been adopted from Ministry of Food covering the period 1991-2020. The historical season-wise

rice production, area, and yield data was available in the various reports of the Bangladesh Bureau of Statistics (BBS) and Department of Agricultural Extension (DAE). The information on inputs uses, and costs and return of paddy and rice has been obtained from FPMU and the agricultural economics division of BRRI. The primary data for figuring out the reasons for rice price hike and the disposal pattern have been gathered by focused group discussion (FGD) and key informant interviews (KII). Four FGDs and two KIIs were done for identifying the reasons for rice price hike with the farmers, millers, rice and paddy traders, and local leaders in the key four rice producing regions of the country, such as, Rajshahi, Mymensingh, Cumilla, and Dhaka. Besides, 280 farmers from 14 agricultural regions were interviewed.

3. Results

3.1 Supply and Demand Situation of Rice

To ensure food security of the people, there is no alternate way other than availability of food through domestic production as well as import. However, historical evidences showed that adequate supply of food grain through domestic production or import does not eventually achieve food security for all. Easy access to food through income or purchasing power or social access in the form of public distribution or private charity must be provided (Talukder, *et al*., 2019). During the period of 2001-2019, rapid advancement and dissemination of modern technologies paved the way of the attainment of self-sufficiency in rice production. After 2008, implementation of structural policies headed the country to achieve a good amount of surplus of rice production up to the year 2019-20. Figure 1 shows the five-year average of per capita availability and requirement of rice. In the latest two intervals, 2011-2015 and 2016-20, substantial surplus of rice per capita was achieved. Almost 2 million tons remained surplus over

the period 2009-2017 and more than 3 million tons over the years 2018 to 2020. The additional import of rice usually increases the national surplus.

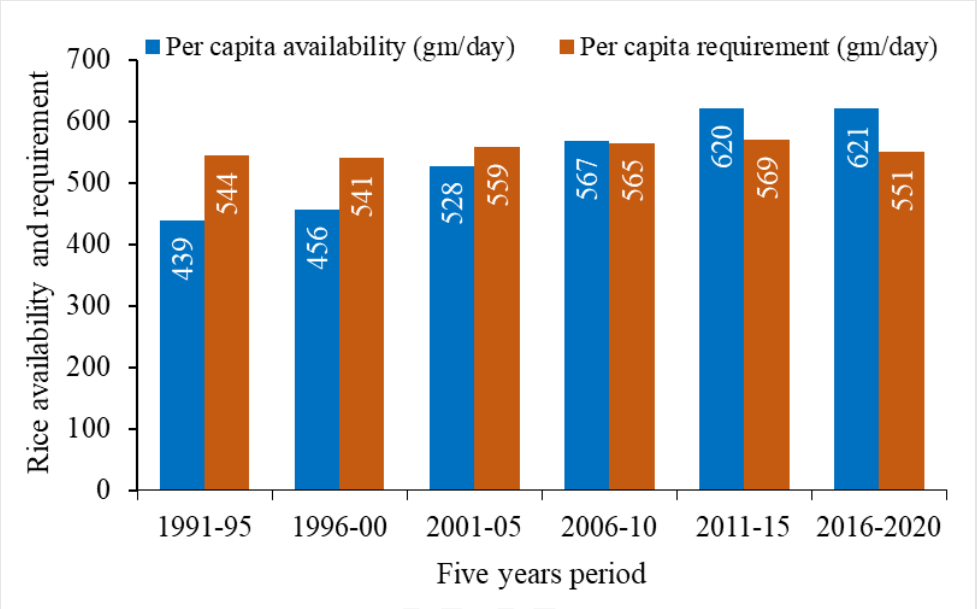

Figure 1: Per capita rice demand supply situation over the five years intervals.

3.2 Economics of Paddy Production: Producer Perspectives

3.2.1 Profitability of T. Aman and Boro paddy

Providing continuous subsidy after 2009 over the price of Urea, TSP, MOP and DAP was expected to sustain rice production as well as reduce the cost of rice cultivation and increase the farm profit (Alam et al., 2020). Even though constant pattern was observed in quantity of input, per acre cost of rice cultivation varied over the period due to input price. The growth of nominal cost of rice cultivation in *Aman* season was 2.92% meaning that cost of production (Tk/kg) continued to increase at 2.92% over the period of 2009–2020 though government used to provide more subsidy on production inputs. The nominal growth of net profit (Tk/kg) from *Aman* season

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was negative 7.70% meaning that farmers used to suffer the loss of *Aman* rice cultivation. Similarly, the growth of nominal cost of *Boro* rice cultivation (Tk/kg) was positive 3.15% and growth of net profit (Tk/kg) was negative 8.50%. In this decade, continuous declining trend of profit impoverish the famers and pushed them to shift their acreage to non-rice crops where possible. It can be noted that producer price of paddy had been higher than unit cost of production from 2016 to 2018 but the net unit cost (Tk/kg) was observed higher than producer price in 2019 and thereby resulting in negative profit. It appears in the figure 2 that per unit return from both *T. Aman* and *Boro* could not compensate per unit cost of production due to unpredictable pattern of paddy price during peak harvest over the years 2009-2020.

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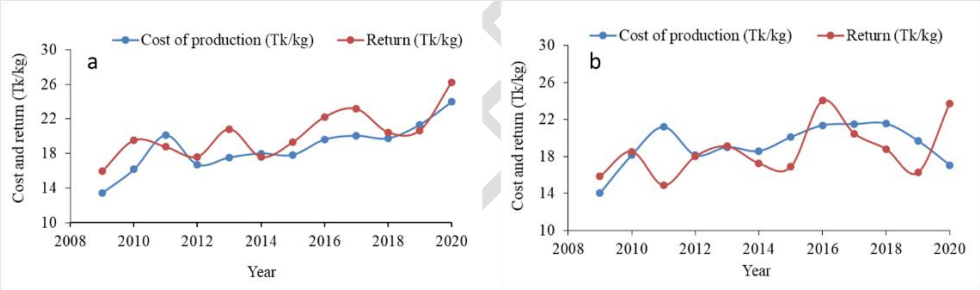

Figure 2: Unit cost of production and return from paddy in both *T. Aman* and *Boro*. Notes: 'a' indicates *T. Aman* and 'b' indicates *Boro*.

3.2.2 Disposal pattern and marketable surplus in 2019 and 2020

Average marketable surplus of paddy at the farmers' level during *Boro* season was about 60% of total paddy production in 2019 while it decreased to 54% in 2020 due to panic of future food crises in the wake of COVID-19 pandemic (Figure 3).

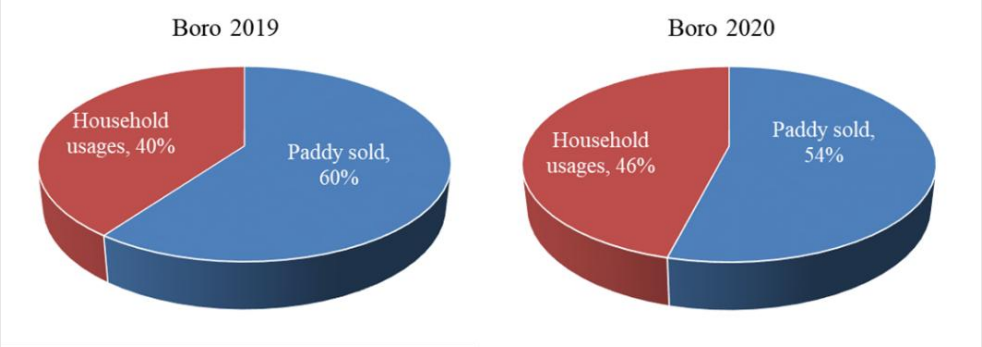

Figure 3: Change in disposal pattern of *Boro* paddy between 2019 and 2020. Source: FGD, 2020.

Almost all of the farmers used to sell major portion of marketable surplus within the first month of harvesting. Pattern of paddy sale changed substantially between two consecutive *Boro* seasons. In *Boro* 2020, farmers released their paddy stock slowly in the market (Table 2). The traders are apprehending the panic of food shortage during COVID-19 pandemic, failure of rice procurement and import by the government, and speculation for higher price retained their stockpiles of rice that reduced the volume of market supply and resulting in increased prices.

Table 2: Selling behavior at farm level in 2019 and 2020

Months	Paddy sold (% of marketable surplus)	
	Boro 2019	Boro 2020
Within one month of harvest	65	52
Two months after harvest	20	25
Three months after harvest	13	18
Four months or above after harvest	2	5

Source: Field survey, 2020

3.3 Economics of Rice Production: Processors and Traders Perspective

3.3.1 Cost of rice processing at mill gate

Figure 4 shows the increasing trend of rice processing cost over the period of 2009-2020. Increase in cost of transportation, higher price of spare parts, labor wages and electricity cost

were the main factors to increase the processing cost of rice. To hire the labor during peak season, millers have to pay in advance to the labor as security money.

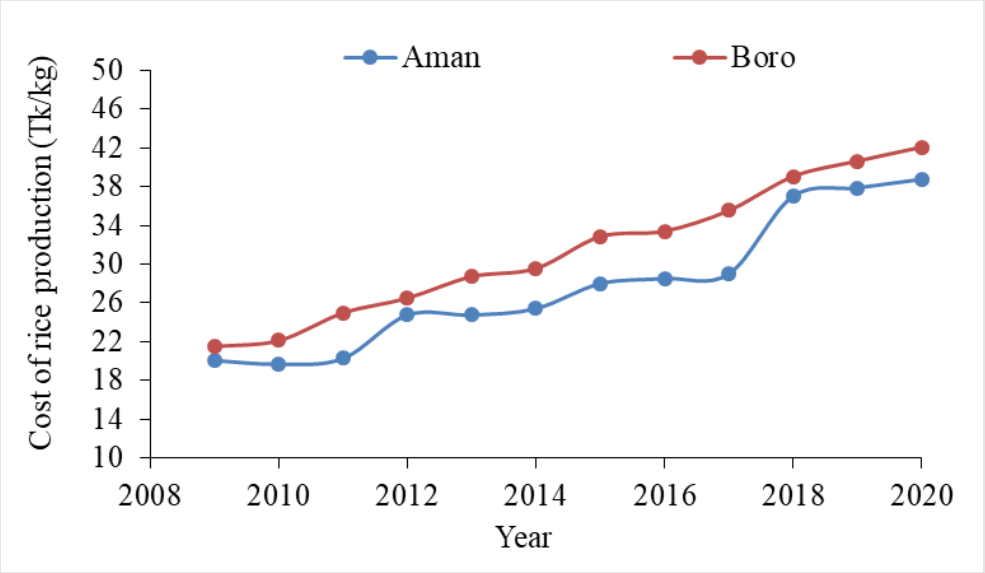

Figure 4: Cost of rice production in *T. Aman* and *Boro* over the year of 2009-2020.

3.3.2 Margin of millers from rice processing

Figures 5 exhibits that valuation of rice production with the by-products using procurement price of rice is profitable and magnitude of the profit per unit ranges from Tk. 4.6 in 2019 to Tk. 9.5 in 2017 in *T. Aman*. In same situation, profit per unit of rice production ranges from Tk. 4.7 in 2020 to Tk. 8.2 in 2018 in *Boro* season. Moreover, the millers gained more profit at market price since it is always higher than procurement price. On the other hand, the millers thought they incurred loss of rice production, but the fact was that they did not take the value of by-products into their account in both the seasons.

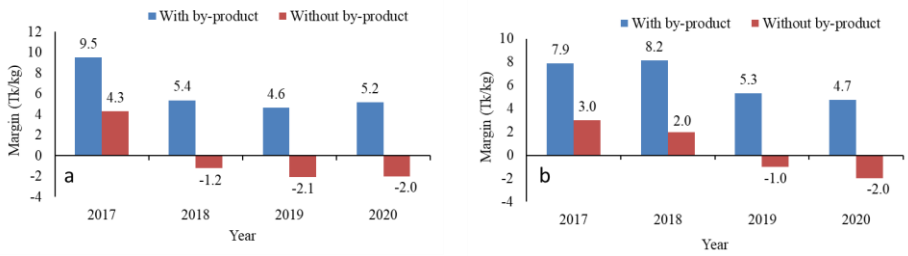

Figure 5: Return from per unit rice production at millers' level in *T. Aman* and *Boro*. Notes: 'a' indicates *T. Aman* and 'b' indicates *Boro*, by-product includes husk, bran, broken rice and dead rice etc. Source: Field survey, 2020.

3.4 Price Variation of Paddy and Rice

3.4.1 Annual trend and growth of nominal and real prices

Average market price of paddy was deflated using consumer food price index (CPI) of the base year 2005-06 in order to obtain the real price. It appears that nominal average market price at the farm level is in upward trend whereas real price in both T. Aman and Boro paddy is in declining trend at all actors' level (Figures 6A-C).

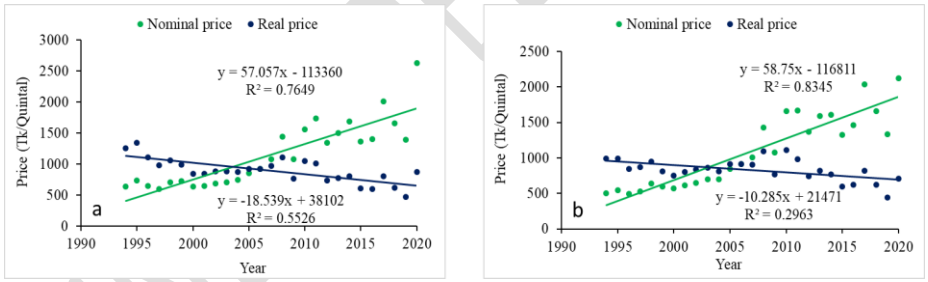

Figure 6A: Nominal and real price of paddy. Notes: 'a' indicates T. Aman and 'b' indicates Boro,

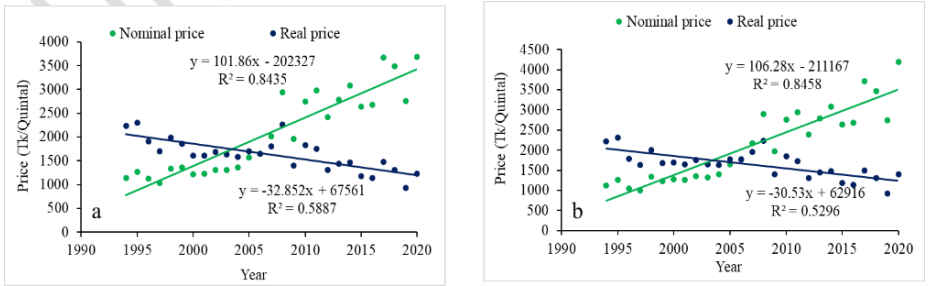

Figure 6B: Nominal and real price of rice at wholesale level. Notes: 'a' indicates T. Aman and 'b' indicates Boro,

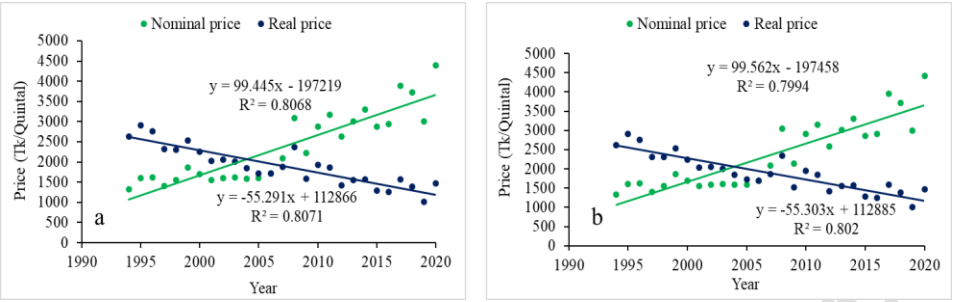

Figure 6C: Nominal and real price of rice at retail level. Notes: 'a' indicates *T. Aman* and 'b' indicates *Boro*.

Negative trend of real paddy price implied that farmers continued losing resources entitlement over the period of 1990-2020 even though nominal price is increasing. Nominal price increases, average, rate of 4-5% whereas real price decreases, average, rate of 2-3% in the market (Table 3). Even though the slope of nominal price in both T. Aman and Boro season was similar at all actor's level, adjustment of inflation in price of T. Aman paddy exhibits the higher market risk compared to that of Boro paddy.

Table 3: Growth rate of nominal and real price of rice (farm gate, wholesale, and retail levels)

Seasons	Nominal price			Real price		
	Farm*	Wholesale**	Retail**	Farm*	Wholesale**	Retail**
T. Aman	4.9	5.03	4.18	-2.2	-2.1	-3.0
Boro	5.7	5.18	4.18	-1.4	-2.0	-3.0
Average	5.3	5.11	4.18	-1.8	-2.05	-3.0

Source: Authors' calculation based on data (covering the period 1990-2020) from Department of Agricultural marketing (DAM). '*' and '**' denotes price of paddy and rice, respectively.

3.4.2 Monthly price trend over the period of 2016-2020

Paddy price increased due to damage of paddy in *Haor* areas during 2017 but delayed implementation of rice import decreased the paddy price in 2018 and 2019. Postponing import

during COVID-19 pandemic and damage by prolonged flood led the paddy price to go up in 2020 (Figure 7).

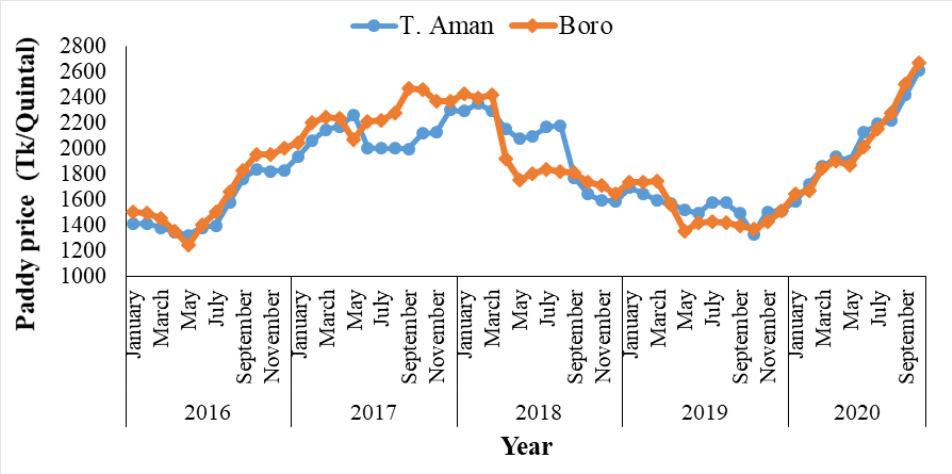

Figure 7: monthly price trend of *Aman* and *Boro* during 2016-2020.

3.4.3 Examination of price fluctuation of paddy and rice over the period of 2016-2020

An analysis of the farmers' price of paddy displaying the coefficient of variations as well as the month of lowest and highest point is presented in Table 6. It can be viewed that, coefficients of variation of the paddy price at farmers' level were higher in the years 2016, 2018 and 2020 and were relatively low in the years 2017 and 2019. The higher price variations of rice were observed between the harvest and the lean periods in each year. Simply, the level of fluctuation was computed between peak and lean period price of paddy over the years. The result indicated that price variability had been irregular and unpredictable during 2016-2020. This was happened due to the fluctuation in production of rice for the floods and plenty of import due to lowering import duty in 2017. The severe outbreak of blast disease was also a disaster to rice production in 2018 as well as holdings huge stock of rice by farmers, traders and millers and no import of rice during pandemic period in 2020 ultimately affected the market price of rice.

The law of demand applied wherein, prices fall during the harvest season and rises during the lean period. The exception is happening during *Aman*, 2020 due to lower yield from frequent flood and irregular heavy rainfall, which led to competitive buying of paddy by the millers, and pushed the market price up. The uprising situation of paddy price and inflexible fixation of procurement price, which remains lower than the market price, may again affect the achievement of the paddy and rice procurement during *Aman*, 2020.

Even though the years of 2017 and 2019 showed relatively low fluctuations in price of *Boro* paddy as compared to other periods, the magnitude of fluctuation beyond the normal value. The maximum and minimum prices of paddy showed reversing within the period of 2016 through 2020. As for example, maximum price was recorded in January 2019 but minimum price was identified in January 2020. The opposite was happened in October during 2019 and 2020. In both *Aman* and *Boro* season, price fluctuation and coefficient of variation was noticed higher in 2016, 2018, and 2020. Price of paddy became higher in January, September, October, and December during the period of 2016 through 2020. Lowest price was in May in Boro season when farmers start or are about to start harvesting and was high in the month of September or October or when the season was lean (Tables 4 and 5).

Table 4: Fluctuation of paddy price in *T. Aman* during 2016 to 2020

Year	Fluctuation (%)	CV*	Maximum	Minimum	Maximum	Minimum	Average	STD**
2016	38.76	13.17	1840	1326	October	May	1543	203
2017	18.65	5.18	2303	1941	December	January	2097	109
2018	48.02	13.66	2352	1589	February	December	2020	276
2019	26.91	5.64	1693	1334	January	October	1545	87
2020	64.80	14.61	2617	1588	October	January	2060	301

Source: Authors' calculation based on the data from DAM. *CV= Coefficient of variation, **STD= Standard deviation.

Table 5: Fluctuation of paddy price in *Boro* during 2016 to 2020

Year	Fluctuation (%)	CV*	Maximum	Minimum	Maximum	Minimum	Average	STD**
2016	60.66	15.37	2005	1248	December	May	1616	248
2017	21.09	5.73	2475	2044	September	January	2266	130
2018	47.96	14.57	2431	1643	January	December	1943	283
2019	28.76	9.55	1746	1356	March	May	1511	144
2020	62.20	15.80	2673	1648	October	January	2056	325

Source: Authors' calculation based on the data from DAM. *CV= Coefficient of variation, **STD= Standard deviation.

Since upstream transmission of price in rice market was common phenomena, change in paddy price directly affects the wholesale price of cleaned rice. Reverse change in price from rice market to paddy market is very slow and sometimes is not observed at all (Rahman et al., 2020; Rahman, 2018). That is why, the pattern and trend of price variation in wholesale market of rice was similar to paddy market. Moreover, the prices showed instable pattern and unpredictable over the period of 2016 through 2020 (Tables 6 and 7). Highest prices in wholesale market during *Aman* were recorded in the month of January, February, June, and October for the years 2016 through 2020 (Table 6) while in the same period of *Boro*, highest price was recorded in January, March, September, October, and December (Table 7). Lowest prices were however mostly recorded in January, May, and December for both *Aman* and *Boro* seasons (Tables 6 and 7).

Table 6: Fluctuation of wholesale price in *Aman* during 2016 to 2020

Year	Fluctuation (%)	CV*	Maximum	Minimum	Maximum	Minimum	Average	STD**
2016	41.43	13.24	3233	2286	October	May	2678	354
2017	24.11	10.04	3989	3214	June	January	3677	369
2018	28.75	7.05	3780	2936	February	December	3486	246
2019	14.85	5.63	3032	2640	January	October	2745	155

2020	53.99	13.84	4153	2697	October	January	3464	479

Source: Authors' calculation based on the data from DAM. *CV= Coefficient of variation, **STD= Standard deviation.

Table 7: Fluctuation of wholesale price in *Boro* during 2016 to 2020

Year	Fluctuation (%)	CV*	Maximum	Minimum	Maximum	Minimum	Average	STD**
2016	48.60	15.01	3299	2220	December	May	2680	402
2017	24.30	6.93	4113	3309	September	January	3718	258
2018	26.15	7.17	3816	3025	January	December	3469	249
2019	19.61	5.63	3080	2575	March	May	2745	155
2020	108.20	19.54	4139	1988	October	January	3320	649

Source: Authors' calculation based on the data from DAM. *CV= Coefficient of variation, **STD= Standard deviation.

3.4.4 Price change and volatility in 2019 and 2020

Figure 8 indicates the rate of paddy and rice price change in 2020 over 2019. Trend of paddy price change increased from March onward but speed of price increase was higher from September onward. A similar pattern was observed in rice market. The paddy price volatility is noticed to be 32% in 2020, higher than in 2019 (28%) (Table 8).

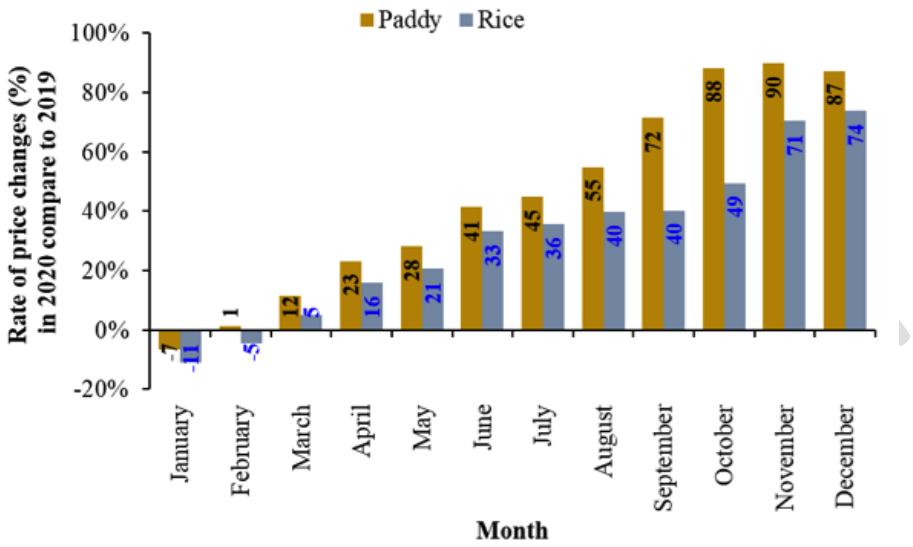

Figure 8: Percentage change in monthly price of paddy and rice in 2020 compare to 2019.

Table 8: Price volatility of paddy and rice in 2019 and 2020

Types	Volatility (%)	
	2019	2020
Paddy	28	32
Rice	11	37

Source: Authors' calculation.

3.5 Does the Marketable Surplus Influence the Market Prices?

In theoretical notions, interactions of supply and demand lead to fix the farmgate price under the perfect market condition. However, during 1991-2009, there has been inverse relationship between marketed surplus and price, meaning that 1% increase in marketed surplus led to decrease the market price at 0.123% per annum. After 2010, a reverse scenario existed in the market where marketed surplus did not have influence on the determination of price in the market (Table 9). The similar scenario was found in the trend line assessment where the relationship between marketed surplus and price has been in the same direction (Figure 9). The

analysis proved the misperception of conventional phenomena because someone from behind scene regulated the determination of price in the market instead of market forces of supply and demand.

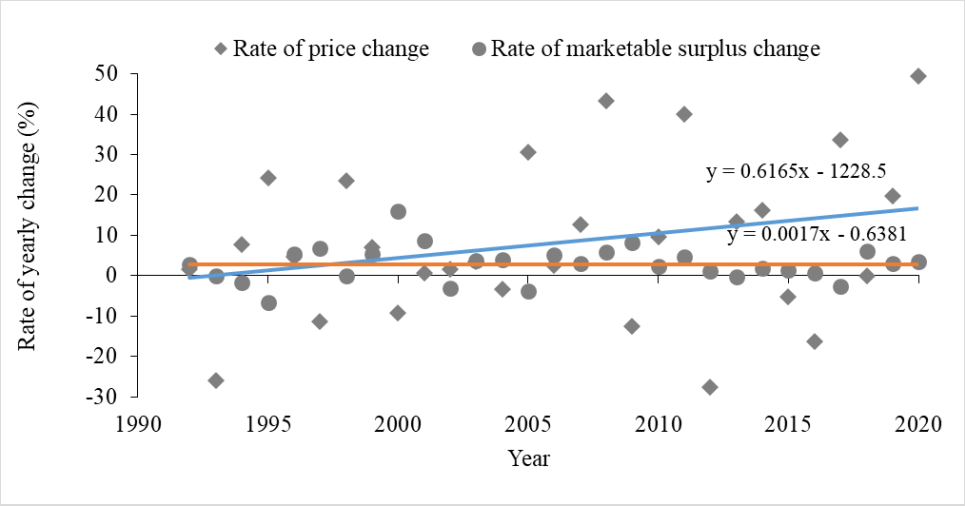

Figure 9: Relationship between change in marketable surplus and market price of rice during 1991-2020.

Table 9: Relationship between marketed surplus and price during 1991 to 2020

Equation	Period	
	1991-2009	2010-2020
Price	-0.123*marketed surplus	0.055*marketed surplus

Source: Authors' estimation

3.6 Procurement and Its Effect on Value Chain Actors

3.6.1 Procurement price of paddy and rice

The market price of paddy below procurement price shows pivotal divergence meaning that farmers did not touch the ceiling of the incentive prices until 2019. As procurement price of paddy in *T. Aman* and market price converged, farmers were happy to receive the good price of paddy in *T. Aman*, 2020 whereas they did not get a good price during *Boro* harvest, 2020. After

two or three months of *Boro* harvest, paddy price in the market was higher than procurement price (more than Tk. 26 per kg) when most of the farmers did not get marketable surplus. That is the reason behind the failure of government procurement purpose from *Boro* 2020.

Historical trend of wholesale price was similar to that of procurement price of rice whereas an opposite direction appeared in paddy market. It implied that procurement price of paddy could not benefit the paddy farmers (Figures 10 and 11). On the other hand, setting procurement price of rice is business orientated since all benefits go in favor of millers and traders. Rationality of price setting was not achieved with the fullest extent in paddy market but government performed rationalized behavior in the fixation of price of rice market.

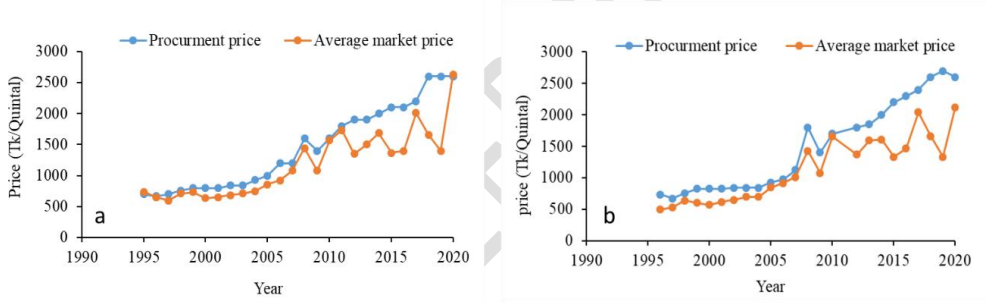

Figure 10: Procurement and average market price of paddy over the years of 1996-2020. Notes: 'a' indicates *T. Aman* and 'b' indicates *Boro*.

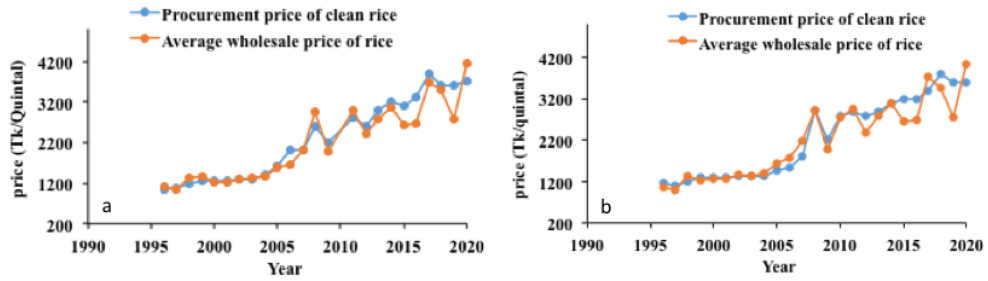

Figure 11: Procurement and average wholesale price of rice over the years of 1996-2020. Notes: 'a' indicates T. Aman and 'b' indicates Boro.

3.6.2 Historical scenario of the procurement

Figure 12 indicates that Government could not achieve the procurement targets in most of the years over the period of 1996-2020. Public procurement achieved only 37.57% of the target in 2020.

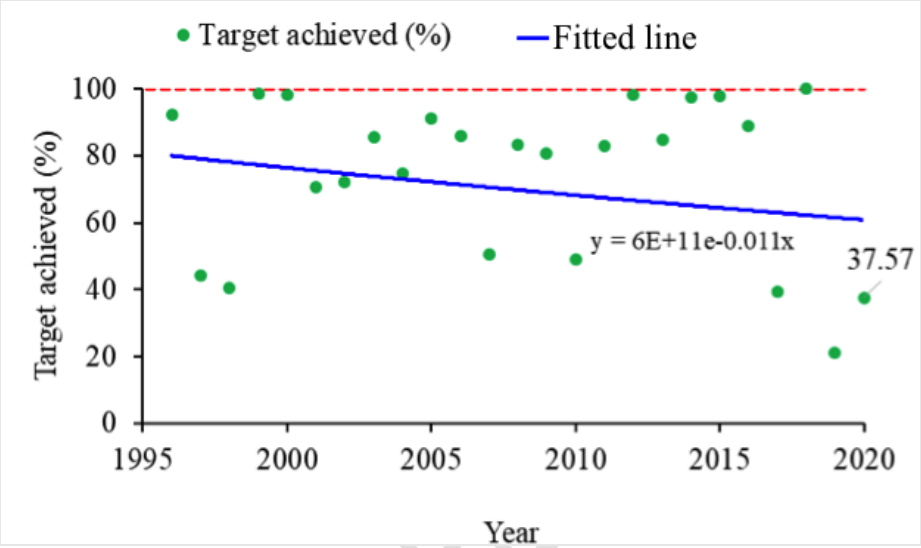

Figure 12: Target and achievement of rice procurement in Bangladesh.

According to millers, they are forced to be enlisted in the procurement program and 2% security payment is a burden for rice processing. Moreover, Rahaman et al., 2020b mentioned some constraints of rice procurement in Bangladesh that should be figured out for developing effective procurement system.

3.6.3 Public stock situation of rice in Bangladesh

Historical stock of rice highly fluctuated and declined in some years that gives an important signal for retention of minimum stock accounting for 1250 thousand tons and increasing the procurement to a minimum of 2500 thousand tons annually. Minimum stock capacity of rice should immediately be developed at 38 lac tons with a view to procure at least 10% of the total rice production each year (Figure 13).

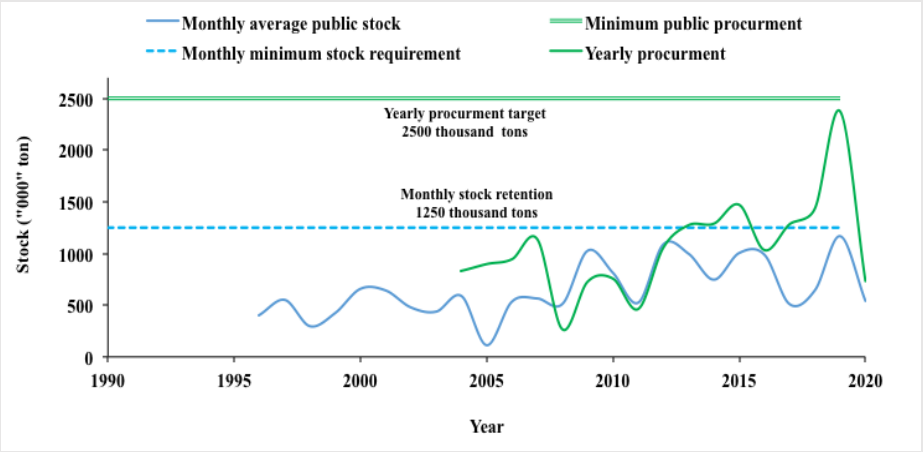

Figure 13: Public stock of rice situation and intervention.

3.7 Reasons for price hike in paddy and rice market during 2020

3.7.1 Supremacy and unequal competition of large millers and traders

According to small rice mill owners' view, large millers and *Aratdar* hoarded huge quantity of paddy and rice in their storage and thereby disrupting supply flow in both paddy and rice market. Fearing food shortages, they stockpiled the purchased paddy in the name of various warehouse keepers and traders. In return, stockiest and paddy traders were getting fixed rates of profit from auto rice mill owners.

The rice market power is entirely under the control of large millers and traders who are controlling the rice market in any way for ensuring higher profits (Rahman et al., 2020). Moreover, the large stockiest and millers are manipulating the market price by applying the policy of supply contraction. As a result, an artificial supply crisis or supply bottleneck exists in the market.

3.7.2 Delayed harmonization of data

According to traders and auto millers, there are substantial data gap in the estimation of area, production, population and demand of rice among DAE, BBS, Ministry of Food and millers and

traders. The delayed harmonization of BBS data and lost the trust of the actors in the value chain (especially millers and traders). Influential actors in the market take the advantage of data error to create artificial crises in the paddy and rice market in order to exploit the super normal profit.

3.7.3 Rice import decision and delayed implementation

According to all traders and millers the price of paddy increased in the domestic market due to postponing the rice imports in 2019-2020. Time lapse between policy decision and implementation provides an opportunity of price volatility. Millers generate the information about an artificial deficit when government announces the import decision.

3.7.4 Stockpiling tendency in 2020

According to the perceptions of the participants in FGD, the higher tendency of stockpiling of paddy and rice at farmers, traders and consumers level was noticed in the country during the panic of global pandemic COVID-19 (possibility of the famine in the world predicted by the national and international development agencies and think tanks). Due to the panic, the stock demand for *Boro* rice pushed up the market price. In addition, large farmers-cum-traders kept a substantial portion of their *Boro* paddy in the stock for obtaining a higher market price in future.

3.7.5 Increase in cost of paddy cultivation and rice processing

According to farmers, labor shortage is getting severe day by day during transplanting and harvesting. Evidences show that higher labor (45%) and irrigation (15%) cost shared about 60% to total cost of production (BRRI, 2019). For this reason, paddy prices increase due to increasing cost of paddy cultivation. Rice mill owners opined that they have increased the price of rice to offset the additional cost since the cost of rice processing has gone up due to increase in cost of transportation, higher price of spare parts, labor wages and electricity cost.

3.7.6 Increasing seasonal traders

According to mill owners, seasonal paddy traders increased in recent days than the previous period. They maintained a stock for generating high profit. Thus, supply flow of paddy in the value chain was squeezed.

3.7.7 Production loss from the disaster

It appears from Table 10, Aus and Boro production has increased in 2020 by 9.63 and 3.17%, respectively compared to that in 2019 whereas Aman production has decreased by 10.06%. All together the national production was decreased by 1.71%, which accounted for a total of 37.42 million tons. Loss of paddy production from *amphan*, prolonged flood and excessive rainfall affected the normal supply in the domestic market.

Table 10: Production scenario in 2020 compared to 2019

Rice season	2019	2020	Rate of change (%)
Aus	3.01	3.30	9.63
Aman	15.50	13.94	-10.06
Boro	19.56	20.18	3.17
Total rice	38.07	37.42	-1.71

Source: DAE, 2020 and BRRI, 2020.

3.7.8 Concept of free and open market economy

Thinking "Leave the market alone" (Laissez-faire economics as Adam Smith mentioned) to better off the business, government should stay away from the market intervention. By taking advantage of this concept, the big traders and millers are creating business margin violently. This situation was repeatedly observed in the stressed years.

4. Conclusion and Recommendations

The value chain actors in the rice supply chain of Bangladesh regulate the market in their own way and sometime earned super normal profit by creating artificial crises. The main reasons for paddy and rice price hikes in 2020 are the panic of food shortage due to COVID-2019 pandemic, stockpiling affinity of the profit seekers, and market manipulation by the big traders and millers. To overcome the price hike, concern ministry and department should have a policy to communicate with the rice millers and traders on regular basis so that a fair business environment prevails in the market with a service-oriented mindset. Data error in rice production, population and food requirement should be properly acknowledged and minimized as early as possible. Trust at all level should be achieved through timely and effective harmonization of all dataset by using digital tools. Import decision for rice should be made following a market calendar, developed based on seasonal rice production. BRRI developed triangle procurement system (see Kabir et al., 2020) can be implemented to ensure equal opportunity in the market. Government should declare the separate minimum support price (MSP) for fine and coarse grain of paddy and rice. Government should retain at least 12 lac 50 thousand tons of rice every month as buffer stock. Procurement price should be declared before the transplanting of a season by considering 20% profit over the production cost. Hidden cost (illegal payment in transportation and market) at all levels should be stopped anyway. Milling outrun (ratio of paddy and rice) should practically be re-determined. Incentive in pricing for electricity, bank interest, and taxation can be declared for auto rice millers. Equity and entrepreneurship fund (EEF) should be available for all the paddy-rice traders and millers. As and when necessary, government should intervene in the market effectively to some extent overlooking the concept of open market economy.

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