

Research Paper

Trend Analysis and Seasonal Variability of Market Arrivals and Prices of Rice in West-Bengal

Sourakanti Sarkar* and Bimal Bera

Department of Agricultural Economics, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, India

*Corresponding author: sourakantisarkar@gmail.com (ORCID ID: 0000-0003-4479-9988)

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ABSTRACT

An attempt has been made to study the behavioural pattern of prices and market arrivals for rice by generating a monthly seasonal index of market arrivals and prices for the crop in five selected markets, namely Bardhaman, Siliguri, Contai, Chakdah, and Bishnupur of West Bengal from 2013–14 to 2018–19. It establishes that the month of February has the greatest average monthly arrival, followed by the months of March and May. It has a declining pattern up until October, after which it climbs upward and reaches its peak in February. In case of prices, long term movement over time has a significant increasing trend pattern except Contai and Siliguri markets. The variability associated with arrival is very high may be due to the uncertain prices and seasonal nature of agricultural production system. But variability related with prices are comparatively less. All five markets have relatively little intra-year price variance. The relationship between market arrival and current price is positive for all markets except Siliguri and Bishnupur where one year lagged price is positively correlated with arrival only for Contai and Bishnupur markets.

HIGHLIGHTS

- ① The different markets have arrived the peak arrival period depending on the time of sowing and harvesting as well as the perception of the respondents of better future prices.
- ① Variability in price is found to be considerably less than that of market arrivals.
- ① The relationship between market arrival and current price is positive for all markets except Siliguri and Bishnupur and one year lagged price is positively correlated with arrival only for Contai and Bishnupur market.

Keywords: ASPV, CV, IPR, Market Arrival, OLS, Price, Seasonal Index, Variability, West Bengal

Due to their periodic production patterns, significant ecological imbalances as compared to other crops, and seasonal variations in consumer demand, agricultural commodities' prices fluctuate often (Kainth and Mehra, 1988). Prices are lowest during the peak of arrivals and gradually increase as arrivals decrease until the completion of the crop season. Price fluctuations are significantly greater for agricultural production than for manufactured goods since it is seasonal and perishable (Singh *et al.* 1993). This fluctuation in farm product prices has a negative impact on farmers' income, which therefore causes volatility in farm investments and reduces crop output. Once more, millions of people

who do not work in agriculture are impacted by the volatile movement of agricultural commodity prices, particularly those employed in unorganized industries whose wages are not index-linked. Due to their low inclination to save and lack of access to effective saving tools, producers, particularly small and marginal farmers in developing nations like India, find it challenging to manage the high volatility of commodities prices, as do consumers.

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Consumers are unable to sensibly distribute their limited resources or money (Bera *et al.* 2017). On the consumer side, agricultural commodity market volatility has already had a considerable influence on farmers' revenue levels as well as the frequency with which agricultural goods are produced (Patel *et al.* 2013). This instability in the prices of agricultural commodities are influenced by number of factors such as annual variation in production, low price elasticity of demand and season ability of agricultural production (Khalon and Tyagi, 1989). This fluctuation in agricultural commodity prices has a negative impact on the I The most crucial elements in establishing a commodity's efficacy at the local and global levels to affect future prices and develop a long-term trading plan are statistics regarding the behavior of the price in terms of price level, trend, and variations (Chand Ramesh, 2002). Market arrival is the arrival of rice to a specific location for sales from different villages, locations, and storage facilities at a specific price point (Aggarwal *et al.* 1990). The products available for purchase at a specific moment at a specific location are known as the market arrival. It may be computed using a year, month, or two-week period (Prakash *et al.* 1995). In the current study, we define market arrivals as the time when farmers finally dispose of their produce. Price may be described as the monetary worth of a product's features that a consumer pays or is anticipated to pay in exchange for the utility they expect or are supplied (Gandhi, 1985). Before a product is made available to the target market for sales, the marketing management of a corporation must determine its monetary value (Jha *et al.* 1988). Rice is the main cereal in West-Bengal for both in production and consumption purpose. The state has 5.8 million ha under rice cultivation with a productivity of 2.6 tonnes/ha (Source: <https://icar.org.in/>). Due to rising production costs and low returns on their crops, West Bengal's rice farmers are currently among the most harmed. The state's rice production has a decreasing cost-benefit ratio throughout time. The production costs have increased significantly as a result of high input costs, notably during the dry (Boro) season, as well as the elimination of subsidies for fertilisers, pesticides, and energy. However, farmers do not see a significant boost in the price they receive for their marketable excess as a result of the circumstance (Adhikari *et al.* 2011). So, the present study has been

undertaken with the following specific objectives delineated as follows:

- (a) To analyze the long-term trend of market arrivals and prices of rice in five different markets.
- (b) To study the seasonal behavior of market arrivals and price of rice and to examine the relationship between current as well as one year lagged price of the selected crops and corresponding market arrivals.

MATERIALS AND METHODS

Data Sources and Sampling design

The present study is based on secondary data collected from various published sources such as, <https://agmarknet.gov.in/published> by Govt. of India. The data of market arrivals and prices of selected crop, rice, are collected from five purposively selected markets, viz., Bardhaman, Siliguri, Chakdah, Contai and Bishnupur market belonging to Bardhaman, Darjeeling, East Medinipur, Nadia and Bankura districts of the state of West Bengal respectively pertaining to the period of 2013-14 to 2018-19 (a period of 60 months).

Empirical Tools

To estimate the trend of monthly arrivals and prices of Tomato in five different markets of West Bengal, the time series data of monthly arrivals and prices are de-seasonalized for adjustment of the seasonal variation by applying method as suggested by Acharya and Agarwal (2009).

De-seasonalized price for the month 't' =

$$\frac{\text{Price/market arrivals for } t \text{ month}}{\text{Seasonal price/market arrivals index}} \times 100$$

After de-seasonalization, the linear trend is estimated by applying Ordinary Least Square method of the following form has been employed.

$$Y_t = a + b_t + U_t$$

Y_t = Monthly time series data on market arrivals/ prices, a = intercept, b = coefficient, and t = time period in month and U_t = disturbance terms

For calculating seasonal variance, the twelve-month centered moving average (TMMA) decomposition method is employed which gives us the periodic changes without seasonality. The actual values are divided by calculated values of TMMA to get the seasonal variations.

$$\text{Seasonal Indices (SI)} = \frac{Y}{T \times C} = \frac{T \times S \times C \times I}{T \times C}$$

[The Time Series data on Arrivals/Prices is denoted by the letter Y . Trend Components are denoted by T , Seasonal Variations are denoted by S , Cyclical Movements are denoted by C , and Irregular Variations are denoted by I].

$$MA(12) = \frac{1}{12} \times \sum PI$$

[Here all data related to market arrivals and prices are converted to index form i.e. multiplied into 100].

$$S.I = \frac{\sum PI}{MA} \times 100$$

$MA(12)$ = Twelve month moving average which represents $T \times C$,

PI = Market arrivals/ Price indices,

$S.I$ = Seasonal Indices for market arrivals/prices.

An extra 2-month moving average is computed to center the 12-month moving average. As a result, irregular and seasonal impacts are represented by the ratio to the moving average. The most random influences will generally be minimized if the ratios for each worked over a period of years are then averaged (Acharya and Agarwal, 2009).

Adjusted seasonal indices (ASI) = Seasonal indices \times correction factor

Correction factor = $1200 \div$ sum of seasonal indices

Seasonal monthly arrivals or price index is estimated by applying the formula presented as follows:

$$Si = [(I_h - I_l) / I_l] * 100$$

Where, I_h = highest value of seasonal index,

I_l = lowest value of seasonal index

By averaging monthly data across years, the impacts of irregular components from monthly time series that are deflated by a correction factor to generate seasonal monthly indices of market arrivals/prices are supposed to be neutralized. The amount of intra-year price volatility was estimated using the following two techniques, which were combined with the coefficient of variation (Bera, 2017).

$$\text{Intra - year price rise (IPR)} = \frac{HSPI - LSPI}{LSPI} \times 100$$

Where Highest Seasonal Price Index is denoted by $HSPI$ and $LSPI$ is the Lowest Seasonal Price Index.

Coefficient of Average price variation (ASPV) =

$$\frac{HSPI - LSPI}{HSPI + LSPI} \times 100$$

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$$\text{Coefficient of variation} = \frac{\text{Standard Deviation}}{\text{Mean}} \times 100$$

For establishing the relationship between market arrivals (x) and prices (y) estimation of correlation coefficient (r) is needed. The formula for estimating r is given below:—

$$r = \frac{COV(x, y)}{\sigma_x \sigma_y} [COV(x, y) - \text{co-variances of } x \text{ and } y]$$

σ_x - standard deviation of x and σ_y - standard deviation of y].

RESULTS AND DISCUSSION

The linear trend analysis of market arrivals and prices of rice has been carried out to estimate the long-run movement over time (Table 1). It discerns that the positive and significant trend is recorded in Burdwan and Chakdah markets and negative and significant trend in Contai markets in case of market arrivals. Bishnupur and Siliguri market have also experienced decreasing trend in market arrival, but not significant. Prices exhibit significant increasing trend with varying magnitude in all markets except Contai and Siliguri markets where estimated trends are positive but not significant.

The variability in market arrivals of rice in five selected markets of West Bengal depicted in table 2 discerns that in Bardhaman market, the average monthly arrival is found to the highest in the month

Table 1: Trends in market arrivals and prices of rice of selected markets of West Bengal

| Sl. No. | Market | Arrivals ($Y = a + bT$) | Price ($Y = a + bT$) |
|---------|-----------|--------------------------------|------------------------------|
| 1 | Bishnupur | $Y = 23370.8 - 365.907 t^{NS}$ | $Y = 1261.83 + 7.50t^*$ |
| 2 | Burdwan | $Y = 145333 + 54.73t^{***}$ | $Y = 1149.35 + 11.21t^*$ |
| 3 | Contai | $Y = 481.76 - 3.91t^{**}$ | $Y = 1004.107 + 10.59t^{NS}$ |
| 4 | Siliguri | $Y = 3379.152 - 11.16 t^{NS}$ | $Y = 1390.106 + 8.416t^{NS}$ |
| 5 | Chakdah | $Y = -3190.81 + 392.73t^*$ | $Y = 1630.225 + 3.499t^{**}$ |

*, ** and *** indicate significance at 1, 5 and 10% level and NS indicates non-significance.

Table 2: Month-wise Variability in Arrival of Rice in selected markets of West Bengal

| Months | Bardhaman | | Siliguri | | Chakdah | | Contai | | Bishnupur | |
|----------|-----------|--------|----------|-------|----------|-------|--------|-------|-----------|-------|
| | Mean | CV(%) | Mean | CV(%) | Mean | CV(%) | Mean | CV(%) | Mean | CV(%) |
| January | 15367.00 | 13.59 | 386.44 | 22.97 | 7918.00 | 87.92 | 57.44 | 25.60 | 1324.60 | 20.60 |
| February | 31819.00 | 102.99 | 335.10 | 21.29 | 8868.00 | 89.14 | 65.38 | 17.80 | 1495.40 | 12.20 |
| March | 17713.00 | 16.90 | 379.70 | 41.24 | 8414.00 | 88.27 | 65.94 | 15.36 | 932.40 | 15.78 |
| April | 13817.00 | 19.21 | 337.30 | 38.14 | 8970.00 | 83.87 | 63.96 | 40.71 | 782.40 | 30.17 |
| May | 15500.00 | 29.45 | 331.80 | 44.42 | 8432.00 | 86.16 | 63.30 | 37.18 | 1072.20 | 35.16 |
| June | 14841.00 | 29.21 | 383.00 | 41.08 | 8288.00 | 82.81 | 60.82 | 22.52 | 984.60 | 27.54 |
| July | 13317.00 | 28.63 | 279.14 | 46.76 | 7610.20 | 84.34 | 60.58 | 29.95 | 1024.00 | 29.95 |
| August | 11388.00 | 18.32 | 346.90 | 42.32 | 8084.00 | 86.51 | 59.16 | 20.82 | 993.60 | 22.84 |
| Sept | 10156.00 | 17.16 | 257.76 | 21.46 | 8844.40 | 86.13 | 53.98 | 23.12 | 1685.60 | 24.13 |
| Oct | 9412.00 | 9.22 | 240.08 | 29.52 | 10952.00 | 92.49 | 52.80 | 38.70 | 1640.00 | 31.71 |
| November | 10057.00 | 13.18 | 267.52 | 21.20 | 9802.00 | 88.35 | 56.46 | 29.57 | 1279.20 | 32.51 |
| December | 13017.00 | 20.47 | 298.90 | 8.61 | 9738.60 | 87.75 | 61.86 | 30.54 | 1394.80 | 29.34 |

of February (31819t) followed by March (17713t) and subsequently followed by May (1500t). From May onwards, it shows a declining trend up to October and then it moves upward and reaches to the maximum level in the month of February.

The maximum market arrival in the month of February is associated maximum fluctuation of 102.99 %. The variability in market arrival varies between 9.22 % in the month of October to 102.99 % in the month of February. For the most of the month, it ranges from 15-30 %. Siliguri market has registered the maximum market arrival in the month of January to the tune of 386.44t followed by June (383t) and March (379.70t). The market has experienced the highest level of fluctuation in the month of July accounting 46.76 %. The variability of arrival varies between 35-45 % during the period March to August and from September to February, it varies between 20-30 %. In Chakdah market of Nadia district, the maximum arrival of 10952.0 t is recorded in the month of October, just before the harvesting of next season autumn rice and gradually declines to the lowest level of 7610.20 t in the month of July with small variations across the months and again starts rising for the remaining two months.

The highest amount of average market arrival of 69.94t is recorded in the month of March in Contai market with a variability of 15.36 %. Then exhibits a steady deceleration to reach the lowest level of 52.80 t in the month of October and the moves upwards to touch the maximum level with the exception of the month January when it marginally falls to the tune of 57.44 t. The fluctuation of monthly arrival varies between as low as 17.80 % in the month of February to as high as 40.71% in the month of April. The average monthly arrival in Bishnupur market of Bankura district is observed to be the highest in the month of September measuring 1685.60 t and then shows a gradual deceleration with small month-wise variation till it reaches the lowest level of 782.40 t in the month of April. For the remaining months, it exhibits a up and down movements in alternative month to attain the maximum arrival in the month of September of the next crop season. The coefficient of variation angles from 12.20 % in the month of February to 35.17 % in the month of May. Table 3 indicates that the average prices of rice is observed to be the highest in August amounting ₹ 1564.00/q and moves downward marginally in each successive month to record the lowest value

Table 3: Month-wise Variability in Price of Rice in selected markets of West Bengal

| Months | Bardhaman | | Siliguri | | Chakdah | | Contai | | Bishnupur | |
|-----------|-----------|-------|----------|-------|---------|-------|---------|-------|-----------|-------|
| | Mean | CV | Mean | CV | Mean | CV | Mean | CV | Mean | CV |
| January | 1383.20 | 12.97 | 1549.00 | 7.91 | 1804.00 | 9.99 | 1244.60 | 16.81 | 1479.20 | 7.81 |
| February | 1406.20 | 14.75 | 1544.00 | 8.43 | 1850.60 | 10.81 | 1266.00 | 17.62 | 1499.00 | 7.34 |
| March | 1434.60 | 17.41 | 1542.00 | 8.62 | 1881.20 | 11.79 | 1278.80 | 13.01 | 1526.80 | 6.31 |
| April | 1453.60 | 16.12 | 1554.00 | 7.58 | 1862.60 | 11.02 | 1250.50 | 13.01 | 1498.40 | 9.25 |
| May | 1493.80 | 13.46 | 1599.70 | 6.58 | 1641.00 | 10.93 | 1272.00 | 16.43 | 1480.20 | 9.61 |
| June | 1537.40 | 11.31 | 1610.00 | 4.56 | 1618.80 | 9.18 | 1296.30 | 17.72 | 1425.80 | 11.82 |
| July | 1560.40 | 11.21 | 1628.40 | 8.41 | 1629.00 | 7.59 | 1342.20 | 16.30 | 1443.20 | 8.87 |
| August | 1564.00 | 11.96 | 1645.60 | 10.35 | 1666.00 | 5.56 | 1400.20 | 14.86 | 1470.40 | 9.60 |
| September | 1562.40 | 13.42 | 1663.40 | 12.72 | 1665.60 | 7.09 | 1423.60 | 13.62 | 1494.20 | 10.36 |
| October | 1550.40 | 13.88 | 1727.10 | 13.57 | 1673.20 | 7.87 | 1426.00 | 12.97 | 1499.40 | 11.08 |
| November | 1498.20 | 16.09 | 1684.60 | 9.15 | 1731.20 | 10.02 | 1392.40 | 15.78 | 1521.40 | 10.82 |
| December | 1464.00 | 15.18 | 1674.00 | 9.91 | 1824.60 | 9.12 | 1344.00 | 18.48 | 1558.60 | 10.83 |

Table 4: Seasonal indices of market arrivals and prices of rice in selected markets

| Months | Bardhaman | | Siliguri | | Chakdah | | Contai | | Bishnupur | |
|-----------|-----------|--------|----------|--------|---------|--------|---------|--------|-----------|--------|
| | Arrival | Price | Arrival | Price | Arrival | Price | Arrival | Price | Arrival | Price |
| January | 95.43 | 94.50 | 125.11 | 98.58 | 112.66 | 104.00 | 102.41 | 94.55 | 106.99 | 101.13 |
| February | 211.33 | 96.26 | 111.49 | 98.47 | 118.17 | 106.88 | 119.85 | 96.60 | 125.15 | 102.60 |
| March | 117.94 | 98.78 | 113.31 | 97.84 | 110.92 | 108.76 | 117.42 | 98.36 | 103.30 | 102.69 |
| April | 94.17 | 98.37 | 99.49 | 97.07 | 117.99 | 107.40 | 106.10 | 95.94 | 75.23 | 101.90 |
| May | 109.50 | 101.26 | 98.91 | 99.60 | 104.59 | 92.95 | 98.87 | 97.95 | 88.33 | 100.90 |
| June | 105.47 | 103.46 | 126.96 | 98.35 | 100.49 | 94.35 | 98.87 | 98.91 | 83.14 | 97.08 |
| July | 93.90 | 105.59 | 87.74 | 101.56 | 91.14 | 94.40 | 100.97 | 101.81 | 87.58 | 97.59 |
| August | 83.13 | 105.38 | 93.07 | 99.87 | 85.33 | 94.35 | 99.69 | 105.79 | 80.42 | 98.16 |
| September | 69.24 | 104.06 | 83.62 | 99.31 | 90.43 | 95.87 | 88.78 | 106.26 | 124.27 | 99.08 |
| October | 61.11 | 102.54 | 82.00 | 102.90 | 93.26 | 97.03 | 82.72 | 106.40 | 116.46 | 98.80 |
| November | 66.76 | 96.89 | 80.98 | 103.84 | 87.79 | 100.49 | 87.37 | 101.47 | 98.08 | 99.31 |
| December | 92.02 | 92.91 | 97.32 | 102.60 | 87.23 | 103.53 | 96.97 | 95.95 | 111.03 | 100.76 |

in the month of January to the tune of ₹ 1383.20/q in Bardhaman market. That the price of rice in Bardhaman market exhibits a definite trend, first declining trend starting from August to January and an upward trend from February to August. The associated monthly variability varies from 11.21 % in June to 16.09 % in November. The average prices of rice in Siliguri market shows a declining trend from the highest-level amounting ₹ 1727.10/q in October to the lowest level of ₹ 1542.00/q in March and then experience rising trend starting from April (₹ 1554.00/q) to October (₹ 1727.10/q). The fluctuation across the month is minimum on an average not exceeding 13.57 % in October which happens to be the same month when the market recorded the highest prices. The Chakdah market of Nadia district has witnessed the highest price amounting ₹ 1881.20/q in March and marginally reduced to ₹ 1862.60/q in April. In May, the price drastically

reduces to ₹ 1641.00/q and moves downward to record the lowest price of ₹ 1618.80/q in June from where it exhibits gradual upward movement in successive months to register the highest price in March with small variation across months. In Contai market, the price of rice is observed to be the highest in October with the magnitude of ₹ 1426/q and the corresponding variability is found to be 12.97 %. After an interval of three months, the price dips into the lowest level in January (₹ 1244.60/q) and again shows increasing trend for two months to experience a marginal fall in March from which it market prices gradually moves upward to reach the maximum level in October. Variability in prices is more or less stable within the range of 12-19 % across the months. The price behavior in Bishnupur market is similar to that of Contai market with small variation across the months. Price variability is found to be more or less stable ranging from 6-12 %.

To ascertain the long run seasonal variation of market arrivals and prices of rice for selected five markets, monthly seasonal index has been constructed by calculating 12-months centered moving average and represented in table 4. It portrays that the highest indices of market arrivals is found in the month of February (211.33%) in Bardhanman market, though the indices values more than hundred are recorded in four months starting from February to June (105.47-211.33%) with the exception of April where the value is found to be 94.17 %. The lowest value is recorded in October (61.11%) and increases gradually to reach 95.43 % in January. In Siliguri, the peak arrival index is noted in June (126.96%) followed by January (125.11%) and subsequently followed by March (113.31%) and February (111.49%). Barring these four months, the seasonal indices is observed to be less than 100 with the lowest value of 80.98% in November. Chakdah market has witnessed more than 100 indices values for the six consecutive months starting from January (112.66%) to June (100.49%) and in the remaining six months, the crop has achieved less than 100 indices value, the lowest being in the month of August (85.33%). The peak arrival period in terms of the highest indices value is noted in February with the magnitude of 119.85 % in Contai market and along with this, indices value more than 100 are recorded in January (102.41%), March (117.42%), April (106.10%) and July (100.97%). In Bishnupur market, six months fall in to the category of 100 indices values, the highest being in the month of February with index value of 125.15% and for other months namely, January, March, September, October and December, the values ranges from 103-125%. In short, all markets have registered more than 100 index values for three consecutive months starting From January to March except Bardaman market in January which has recorded less than 100 value which may be attributed to the fact that these months succeeded the harvesting time of autumn rice in West Bengal. Besides these three months, different markets have attained more than 100 index values depending on the farmer’s expectation of higher prices in future time.

In case of price, seasonal price index is found to be the highest in July (105.39%), at the time of next season sowing of rice, though the indices value more than 100 is experienced in six consecutive

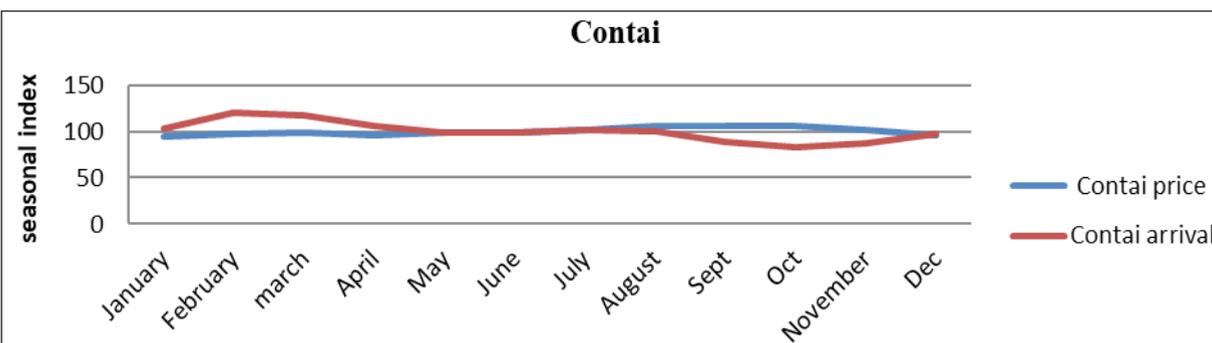
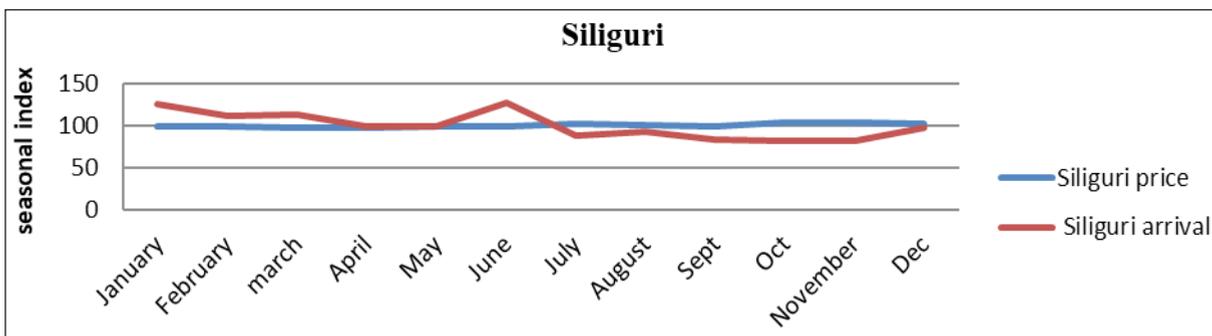
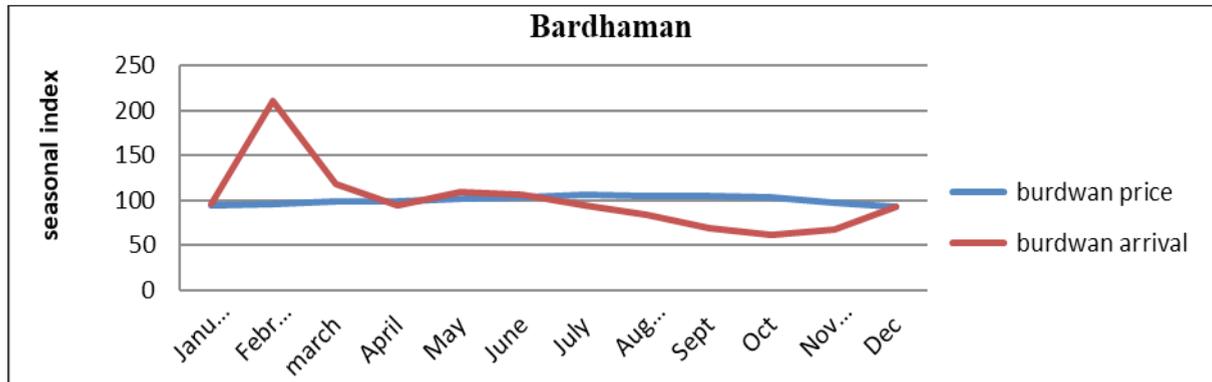
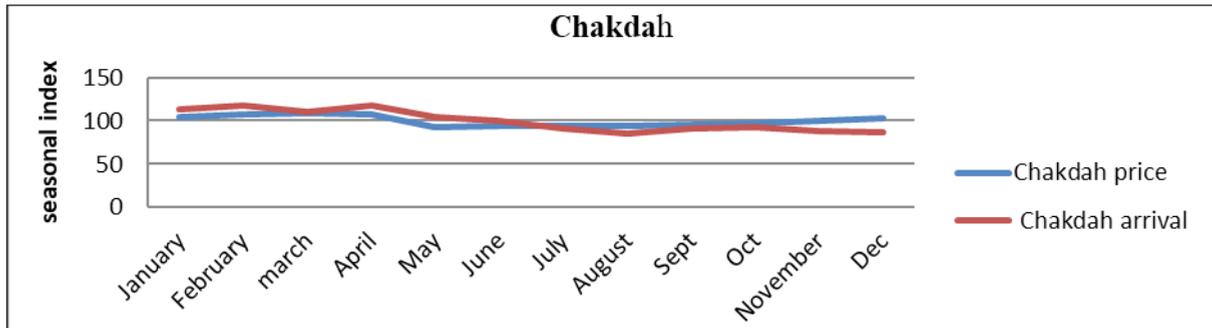
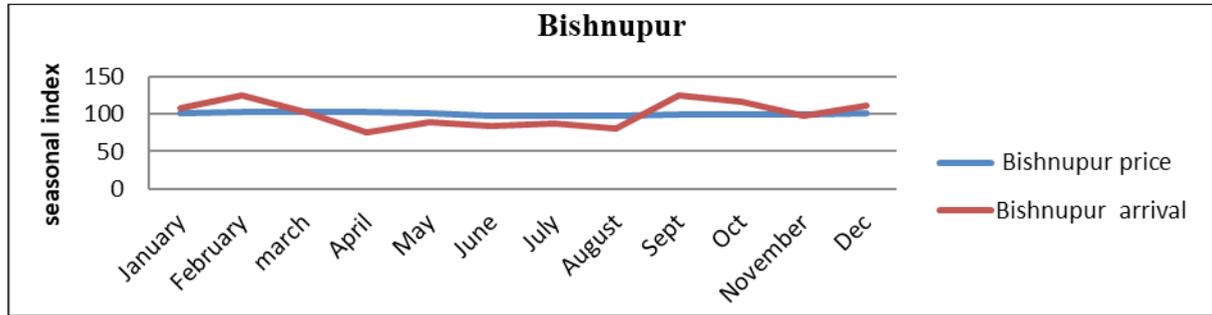
months starting from May to October. The lowest index value is recorded in the month of December (92.91%) from where the value shows a rising trend to reach the value 100% in May with small variation across the months in Bardhaman market. The seasonal indices of prices of rice (common) in Siliguri Market is the lowest in April (97.06) and then it gradually increases and becomes highest in November (103.84). Only three consecutive months, starting from October to December, the crop has recorded more than 100 index value which appears to be the previous months of peak market arrivals. For Chakdah market, the highest seasonal index of price is recorded in March (108.75) and the lowest is found in May (92.95). For consecutive six months, starting from January to June, price index value is found to more than 100 and the remaining six months have registered less than 100 index value. The lowest seasonal index of price in Contai market is shown in January (94.55) and gradually moves upward in successive months to attain the 100 percentage value in July, just before the next sowing season and maintain the same for the next five months, though the highest value is noted in October (106.39).

In case of Bishnupur market, the seasonal index of prices is the highest in March (102.69) and lowest in June (97.08). After being lowest, it increases gradually at a very small rate in successive months to attain more than 100 indices value in December with the tune of 100.76. Starting from December to May, the market has been able to retain the price index value more than 100, although the variation across the months is very negligible.

Table 5: Intra-year price rise, Average seasonal price variation & Co-efficient of Variation in selected markets of West Bengal

| Markets | IPR | ASPV | CV (%) |
|-----------|-------|-------|--------|
| Bardhaman | 13.66 | 12.78 | 4.13 |
| Siliguri | 6.98 | 6.74 | 2.11 |
| Chakdah | 1.51 | 1.49 | 5.61 |
| Contai | 12.53 | 11.79 | 4.10 |
| Bishnupur | 5.78 | 5.62 | 5.62 |

The extent of intra-year price variation measured in terms of intra-year price rise (IPR), average seasonal price variation (ASPV) and co-efficient of variation (CV) depicted in table 5 discerns that the maximum intra-year price rise is experienced by Burdwan



market (13.65%) followed by Contai (12.53%) and subsequently followed by Siliguri (6.98%) and Bishnupur (5.78%). In Chakdah market, the intra-year price rise is estimated to be only 1.50 % which is negligible compared to other markets. The pattern of ASPV across the markets is similar to that of intra-year price rise with variation in magnitude. The highest and lowest ASPV is recorded in Burdwan and Nadia with values 12.78 and 1.49% respectively. But the ordering of the markets based on fluctuation in prices measured in terms of coefficient of variation presents a different order.

Table 6: Correlation coefficient between current prices and market arrivals as well as one year lagged prices of Rice

| Markets | Correlation Coefficients | |
|-----------|--------------------------|---------------|
| | Current Prices | Lagged Prices |
| Burdwan | 0.01938 | -0.21028 |
| Siliguri | -0.20764 | -0.09687 |
| Chakdah | 0.155612 | -0.05085 |
| Contai | 0.023182 | 0.130459 |
| Bishnupur | -0.68778 | 0.11877 |

Here, Chakdah occupies first position by registering the highest value of 4.13% and Burdwan and Contai markets come next in order by scoring a value of 4.13 and 4.09% respectively. Siliguri market occupies the fourth position with CV of 2.10 % in place of third position held in the previous to measures. Bishnupur is the lowest registering the lowest CV, i.e., 1.84 percent. Conceptually, the market arrival is expected to be increasing function of prices whereas market price is expected to be the decreasing function of market arrivals. The correlation coefficients of current prices as well as one year lagged prices of these markets presented table 6 demonstrates that the price of rice is negatively related with the market arrival in Bishnupur and Siliguri and for other three markets, current price is positively related with the market arrivals. The positive correlation between market arrivals and current prices in those three markets may be attributed to the high retention capacity of the farmers which may have enabled them to respond positively to price. In case of one year lagged price of rice, negative correlation with the market arrivals is recorded in Burdwan, Siliguri and Chakdah market whereas it is positively correlated in Contai and Bishnupur Market.

CONCLUSION

The study on market arrivals and prices of rice in five markets of West Bengal indicates that the different markets have arrived the peak arrival period depending on the time of sowing and harvesting as well as the perception of the respondents of better future prices and the variability associated with arrival is very high across the markets may be due to the uncertain prices and seasonal nature of agricultural production system. In case of price, variability doesn't show much fluctuation over the markets like arrival. This lower fluctuation may be the result of a uniform demand of rice throughout the year being a staple food crop along with good storage facility and high retention capacity of some farmers. Intra year variation is also very small for all five markets. The relationship between market arrival and current price is positive for all markets except Siliguri and Bishnupur and one year lagged price is positively correlated with arrival only for Contai and Bishnupur market.

REFERENCES

Acharya, S.S. and Agarwal, N.L. 2009. *Agricultural Marketing in India*, Oxford & IBH publishing co. *Pvt. Ltd. New Delhi*.

Adhikari, B., Bag, M.K., Bhowmick, M.K. and Kundu, C. 2011. Status paper on rice in West Bengal. *Hyderabad (India): Rice Knowledge Management Portal, Directorate of Rice Research, India*.

Agarwal, N.L. and Om, H. 1990. Pattern of market arrivals and prices of rapeseed and mustard in Bharatpur district (Rajasthan). *Indian J. Agril. Market.*, 4(2): 140-146.

Bera, B. 2017. A study on the variability in market arrivals and prices of potato in some selected markets of West Bengal. *Int. J. Agric. Sci., ISSN, 0975-3710*.

Chand, R. 2002. *Trade Liberalisation WTO and Indian Agriculture: Experience and Prospects*. Mittal Publications.

Gandhi, J.C. "Marketing A Managerial Introduction", Tata Mc Graw Hill Publishing Company, New Delhi, pp. 217. 4S.M.

Government of India, Directorate of Marketing & Inspection (DMI), Ministry of Agriculture and Farmer-Welfare, <https://agmarknet.gov.in/>

Jha, S.M. and Singh, L.P. 1988. *Marketing Management in Indian Perspective*.

Kahlon, A.S. and Tyagi, D.S. 1989. *Agricultural price policy in India*. 2nd edition. Allied Pub. Mayapuri, New Delhi.

Kainth, G.S. and Mehra, P.L. 2003. "Seasonality pattern of market arrival and prices of potatoes in Punjab." *Indian J. Agril. Market.*, 2(1): 113-120.

Patel, S.A. and Patel, J.M. 2013. A comparative study of arrivals and prices of agricultural commodities at APMC using Time Series Analysis. *Int. J. Adv. and Innov. Res.*, **2**(4): 778-782.

Singh, J., Kumari, S. and Grover, D.K. 1993. "Behavioral analysis of market arrivals and prices of potato in Punjab." *Agril. Market.*, **36**(3): 34-42.

Prakash, B., Srivastava, S. and Lal, S. 1995. Market arrivals and prices of urdbean in Uttar Pradesh. *Indian J. Pulses Res.*, **8**: 56-61.

