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**Ragade Reshma**

Sayalee Vijay Salunkhe,  
Ph. D Scholar MPKV, Rahuri,  
Maharashtra, India

**Kale SD**

Sayalee Vijay Salunkhe,  
Ph. D Scholar MPKV, Rahuri,  
Maharashtra, India

**Salunkhe SV**

Sayalee Vijay Salunkhe,  
Ph. D Scholar MPKV, Rahuri,  
Maharashtra, India

## Prices and arrivals of wheat in Maharashtra

Ragade Reshma, Kale SD and Salunkhe SV

**Abstract**

The research entitled price behaviour of wheat in Maharashtra was carried out with objective to study the seasonal and cyclical variations in prices and arrivals of Wheat. The present study was based on secondary data consisting of monthly prices and arrival of Wheat collected from five major Agriculture Produce Market Committee (APMC's) namely Nagpur, Akola, Amravati, Aurangabad and Kopergaon as the arrival of Wheat in this market were highest. The data covered a period of 13 years i.e. 2004 to 2016. The prices of Wheat were higher from the month of July to December in all selected markets. The arrivals were found to be highest from March to June. The highest cyclical prices recorded during the year 2008, 2014 and 2015 in selected markets. The higher cyclical arrivals were recorded during the year 2007, 2012, 2013 and 2016 all the selected markets.

**Keywords:** Wheat, seasonal indices, cyclical indices, prices, arrivals

**Introduction**

Wheat (*Triticum aestivum*) is the first cereal crop for the majority of world's populations. It is the most important staple food of about two billion people (36% of the world population). Wheat is *rabi* crop which is sown in the beginning of winter and harvested in the beginning of summer. Worldwide, wheat provides nearly 55 percent of the carbohydrates and 20 percent of the food calories consumed globally. China is the first in production in world, which area account over 40%. It exceeds in acreage and production every other grain crop (including rice, maize etc.) and is therefore, the most important cereal grain crop of the world.

India is the second largest producer next to china in world 12 per cent share in total world. Wheat is grown in India in area about 30 million ha. with production 93 million tone. Next to the rice, wheat is the most important food grain of India and is the staple food of millions of Indians. The state of Maharashtra was selected to study market integration because it accounts 4.5 percent of wheat area and 1.38 percent of wheat production in the country.

**Objective**

To study the seasonal and cyclical variations in prices and arrivals of wheat.

**Methodology**

The study was based on secondary data. Hence, a reliable source of data is very important to get the real picture. Secondary data consisting of monthly prices and arrivals of wheat were collected from five major Agriculture Produce Market Committee (APMC)'s namely Amravati, Akola, Kopergaon, Aurangabad and Nagpur as the arrival of wheat in this market were highest. The secondary data on area, production and productivity of Wheat for Maharashtra was collected.

Most widely used method of measuring seasonal fluctuations i.e. method of moving average was used to calculate seasonal indices. To measure the seasonal variations in prices and arrivals, seasonal indices were calculated employing twelve months ratio to moving average method. The seasonal indices were calculated by adopting the following steps:

1. Generate a series of 12 months moving totals.
2. Generate a series of 12 months moving averages: A series of 12 months moving averages is generated by dividing 12 months moving totals by 12.
3. Generate a series of centered 12 months moving averages. This step involves taking averages of pairs of two subsequent 12 months moving averages and entering between each pair. There are no corresponding moving averages for the first six and last six months.
4. Express each original value as a percentage of corresponding centered moving average. The percentage of moving average represents indices of seasonal and irregular components combined.

**Corresponding Author:****Ragade Reshma**

Sayalee Vijay Salunkhe,  
Ph. D Scholar MPKV, Rahuri,  
Maharashtra, India

- The next step involves removing the irregular component.
- Arrange the percentages of moving averages in the form of monthly arrays.
- Next, the average index for each month is calculated.
- These averages are to be adjusted in such a way that their sum becomes 1200. This can be done by working out of correction factor and multiplying the average for each month by this correction factor. The correction factor (K) is worked out as follows:

$$K = \frac{1200}{S}$$

Where, K is correction factor and S is sum of averages indices for 12 months, multiply K with the percentage of moving average for each month to obtain the seasonal indices.

### Estimation of cyclical indices of prices and arrivals of Wheat

The residual method of estimating cyclical movement in time series was used for estimating cyclical indices, after eliminating the seasonal variation and trend components. This is accomplished by dividing ( $Y_t$ ) by corresponding (S) for time 't' symbolically. These deseasonalized data contain cyclical and irregular components and are plotted against time for examining cyclical behaviour. If there is any existence of cycle, periodicity of cycle is noted.

### Performance of Wheat in Maharashtra

#### Seasonal and Cyclical variations in prices and arrivals of Wheat

##### Seasonal indices for Wheat prices

In order to analyse the long run seasonal variation in prices of wheat in the selected markets, seasonal indices for prices was computed by adopting 12 months moving average method. The seasonal indices of monthly prices of wheat in the selected markets are presented in table

**Table 1:** Seasonal indices for Wheat prices in selected markets of Maharashtra

Month	Nagpur	Akola	Amravati	Aurangabad	Kopergaon
Jan	97.35	98.40	99.95	99.70	93.89
Feb	89.62	94.91	99.18	99.38	99.61
Mar	94.86	89.87	97.43	98.17	98.97
Apr	96.27	97.13	93.74	99.06	99.77
May	99.27	99.29	98.02	99.88	97.76
Jun	99.16	97.87	99.93	99.00	97.41
Jul	100.34	103.94	100.12	100.88	100.00
Aug	101.79	101.63	100.19	101.04	100.19
Sep	102.48	103.10	100.1	100.88	100.82
Oct	103.63	102.01	101.22	100.62	101.88
Nov	104.16	105.37	107.50	103.56	106.06
Dec	105.01	105.41	104.76	100.34	106.8

It is observed from the table that, in Nagpur market highest seasonal index were found during July to December month. The similar results were observed in all selected APMC of Maharashtra. Highest index of prices almost in November and December month in all selected APMC of Maharashtra due to lean period.

### Cyclical indices for Wheat prices

The cyclical indices for Wheat prices were worked out for the period 2004-2016 and are presented in table

**Table 2:** Cyclical indices for Wheat prices in selected markets of Maharashtra

Year	Nagpur	Akola	Amravati	Aurangabad	Kopergaon
2004	95.04	95.43	93.31	97.46	96.14
2005	95.60	94.33	95.49	96.57	99.99
2006	93.31	96.32	97.71	97.24	94.46
2007	96.84	98.28	99.25	96.09	97.44
2008	101.83	103.62	101.65	102.06	102.55
2009	98.71	97.39	97.76	97.46	99.80
2010	95.08	89.70	93.33	90.15	94.19
2011	97.97	92.33	97.60	98.90	99.26
2012	98.62	95.32	98.39	99.75	98.46
2013	99.84	96.01	98.91	99.22	96.76
2014	108.89	105.16	104.24	109.22	106.76
2015	103.61	102.92	101.71	105.58	101.49
2016	96.14	94.23	99.17	97.82	95.36

It is observed from the table that, in Nagpur market the highest value of cyclical indices were observed in the year 2008 and 2014 to 2015, were found to be 101.83, 108.53 and 103.61 respectively. It indicated that the highest prices are observed in these years. The highest prices indices were recorded in year 2008, 2014 and 2015 in Akola market and were found to be 103.62, 105.16 and 102.92 respectively. In market of Amravati higher indices were recorded in year 2008, 2014 and 2015, were found to be 101.65, 104.24 and 101.71 respectively. As per regarding in Aurangabad the highest prices indices were recorded in year 2008, 2014 and 2015, were found to be 102.06, 109.61 and 105.58 respectively. The higher prices indices were recorded in year 2008, 2014 and 2015 in Kopergaon market.

### Seasonal indices for Wheat arrival

In Maharashtra wheat is cultivated in about 4.5 per cent in area. Wheat account for 1.38 percent in wheat production in Maharashtra. Wheat is rabi crop which is sown in the beginning of winter and harvested in the beginning of summer. The sowing of wheat crop normally begin in the September-October and harvesting in January-February in Karnataka, Maharashtra, Andhra Pradesh, Madhya Pradesh and West Bengal.

**Table 3:** Seasonal indices for Wheat arrivals in selected markets of Maharashtra

Month	Nagpur	Akola	Amravati	Aurangabad	Kopergaon
Jan	24.90	43.25	48.42	52.56	34.03
Feb	24.93	46.56	71.920	52.96	45.52
Mar	236.49	189.11	143.23	190.60	295.68
Apr	309.73	296.08	246.77	200.76	296.31
May	165.85	157.55	196.46	127.48	158.35
Jun	112.08	109.31	125.49	84.56	99.92
Jul	76.72	68.95	68.12	78.42	42.89
Aug	68.99	80.42	63.65	89.25	36.40
Sep	53.97	60.39	62.65	107.02	47.48
Oct	50.89	48.88	56.52	99.873	62.54
Nov	47.02	49.74	52.83	60.29	46.47
Dec	39.27	49.71	63.89	55.17	34.33

It is seen from the table that the indices of seasonal price variation were highest in April whereas lowest in January in all selected markets. In Nagpur APMC March to June was the peak period of arrivals of Wheat is indicated by value of seasonal indices. The similar results were also observed in all selected APMC of Maharashtra. The lean month of arrivals was July to February in all selected markets of Maharashtra.

### Cyclical indices for Wheat arrivals

The cyclical indices for Wheat arrivals were worked out for the period 2004-2016 and are presented in table

**Table 4:** Cyclical indices for Wheat arrivals in different markets of Maharashtra

Year	Nagpur	Akola	Amravati	Aurangabad	Kopergaon
2004	96.53	96.26	94.24	93.06	92.45
2005	94.70	90.77	91.01	90.98	92.64
2006	94.96	94.81	93.27	98.08	98.74
2007	103.12	102.38	104.06	105.93	103.92
2008	97.93	96.10	97.89	99.13	98.63
2009	98.72	94.80	95.00	97.39	98.76
2010	99.66	92.90	93.69	96.19	96.83
2011	99.70	93.40	98.85	98.48	97.81
2012	108.38	104.63	103.41	106.29	102.41
2013	105.88	103.67	103.01	104.52	104.31
2014	96.61	92.60	93.16	94.67	95.73
2015	96.91	92.60	95.26	95.51	98.16
2016	103.73	101.90	101.90	103.17	102.53

It is seen from the table that the highest arrivals of wheat was observed in year 2007, 2012, 2013 and 2016 in all selected APMC of Maharashtra. The lowest cyclical indices were observed in year 2005 in Nagpur, Akola, Amravati, Aurangabad and Kopergaon markets of Maharashtra.

### Conclusions

1. The cyclical variations were observed in the prices of wheat in the selected markets. The highest prices recorded during the year 2008, 2014 and 2015 in all selected markets.
2. The arrivals were found to be highest from March to June. The peak period of arrivals of wheat in the selected markets in month of April. Arrivals are high in this period because rabi sowing normally takes in September to October and the arrivals start reach marketing March and June and the peak month are March and April.
3. The cyclical variations were observed in the arrivals of wheat in the selected markets. The higher cyclical arrivals were recorded during the year 2007, 2012, 2013 and 2016 in all selected APMC of Maharashtra.

### Policy Implication

The speed of adjustment, however, varies across different market pairs. The strengthening of physical infrastructure, use of information and communication technology and well defined transparent agricultural policy/market measures in the state will help in the development of single uniform economic market in the region in particular and country in general.

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