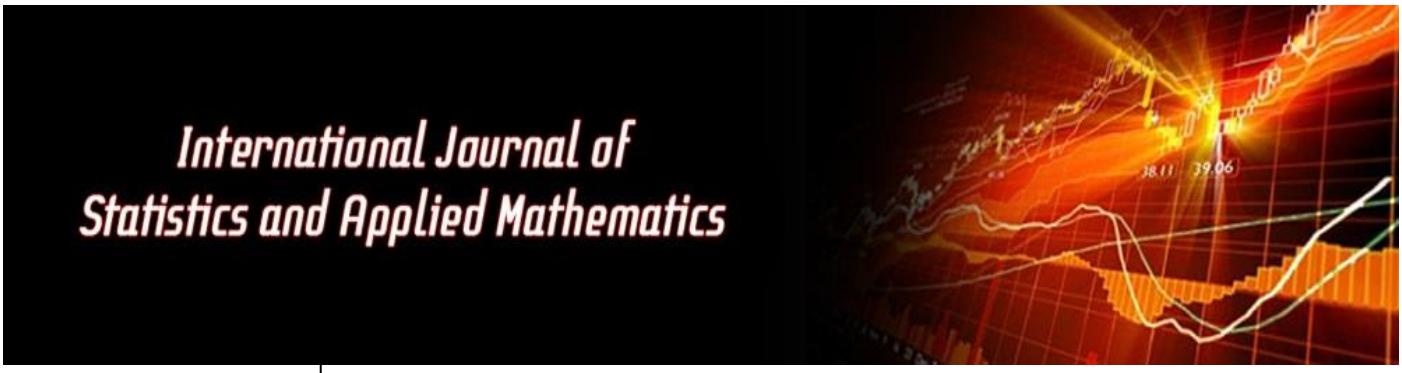

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Effectiveness of agricultural price policy on wheat in Maharashtra

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Abstract
Wheat production os about 70 millions tonnes per year in India and counts for approximately 12 percent of the world production. In Maharashtra state, the area under wheat cultivation during 2020-21 was 13062.35 (00 hectares) with total production of 26411.91 (00 tonnes) and yield of 2021.99 kgs per hectares. Maharashtra ranks 8th place in wheat production in country. Keeping in view the importance of Wheat crop in Maharashtra the present study was concluded with a defined objectives and methodology. The study reveled that, the growth in area of wheat stagnant over a period of study and the production growth of the wheat was significantly increased during study period. As the variability in WSPs was medium in wheat crop of the study, it denotes were volatile in terms of prices and also that regular variability in MSP was observed in wheat during study period. The compound growth rates of MSP were slightly higher than WSP of the study. Significantly positive growth rates were observed for FHP and MSP of wheat crop. It was observed that, significance gap between FHP, WSP and MSP do not differ significantly. As about the deviation of FHPs, WSPs vis-à-vis MSPs, it was detected that, frequency of negative deviation occurred 2 and 5 times while about positive deviation it was 29 and 26 times of wheat crop respectively. The adjusted difference (positive) between MSP and FHP/WSP was as above 93 percent / 83 percent of the MSP and the negative difference was very low. It was also observed that, the impact of MSP, FHP and WSP on area, production and productivity is middling under wheat crop during the study period.

Keywords: Wheat, WSP, MSP, FHP, area, production & productivity, price policy

Introduction
Agriculture policy is considered as the most important national economic policies through which the country can achieve the goal of improving the level of national agricultural income thus the economic and social standards for workers in the agriculture sector in particular and whole population in general. In developing country, where agricultural is very dominant the agricultural prices occupy in key position in price structure. Its plays a dominant role in shaping the pace and pattern of agriculture growth. The agricultural price policy reshapes and distribution of income, not only the agricultural sector, but also in the agricultural and non-agricultural sector.

In India, wheat is considered the most important cereal crop. Its estimated 29.8 millions hectares of land are planted with crop in the country. Verious studied and researchers show that wheat and wheat flour play an increasingly important role in the management of India's food economy. Wheat production of about 70 millions tonnes per year in India and counts for approximately 12 percent of the world production. In Maharashtra state, the area under wheat cultivation during 2020-21 was 13062.35 (00) hectares with total production of 26411.91 (00) tonnes and yield of 2021.99 kgs per hectares. Maharashtra ranks 8th place in wheat production in country.

The nature of supply of agriculturally products generally result in instability prices and income within agricultural sector as well as the others sectors of economy. Stabilization of price of essential agricultural commodities continues to remain as an area of major concern of policy makers. Price instability affects both producers and consumers and has micro-economic implications as well. High growth in the prices of primary commodities spills overs to others sectors of the economy leading to an increase in the overall rate of inflection.

MSPs are prices fixed by government of India to protect the producer-farmers-against excessive fall in price during bumper production years. Such minimum MSP are fixed at incentive level, so as to induce the farmers to make capital investment for the improvement of their farm and to motivate them to adapt improve crop production technologies to step up their production and there by income. The farm harvest prices (FHP) are those which are prevailing during a six to eight weeks immediately after the harvesting period and wholesale prices are those which prevail in the wholesale markets. WSP accordingly is the rate at which a relatively large transaction, generally for further sale, is affected price policy for agric-produce is to set remunerative prices with a view to encourage higher investment and production.

The agricultural price policy (MSP) has outlived its utility and is being used more as a political tool than an economic tool. Therefore, it becomes imperative to examine the effectiveness of MSP in different regions of the country as well as its contribution towards growth. Since MSP policy is consider to have approved mostly the surplus states, its role and contribution towards production was examined for the Maharashtra state. Therefore, this study was conducted with the specific objectives to study the to estimate the growth of area, production, productivity, MSP, FHP and WSP of wheat in Maharashtra, to study the gap between FHP and MSP, WSP and MSP of wheat in Maharashtra and to examine impact of MSP, FHP and WSP on area, production and productivity of wheat in Maharashtra.

Material and methods

The present study based on secondary data for the years 2001-02 to 2020-21 and the time series data on MSP, FHP, WSP, area, production and productivity of wheat was collected from various official sources like Commission for Agricultural Prices and Costs (CACP), www. Indiastat. com, Directorate of Economics and Statistics, Department of Agriculture and Farmers welfare, Ministry of Agriculture and Farmers welfare, Government of India, agmarknet.nic.in, etc. The data were compiled and analysed using standard statistical tools.

Statistical tools

Computation of growth rate

$Y= ab^t$

Log Y = Log a + t log b

Where,

Y= area/ production /productivity

α= intercept

b= regression coefficient

t = time period in year

Compound growth rate (%) = {Antilog (log b)-1}*100

Gap between FHP/WSP and MSP of wheat in Maharashtra

The study based on the secondary data on FHP, WSP and MSP of wheat in Maharashtra. To study effectiveness of the price policy during the harvest periods and wholesale prices periods, the deviations of farm harvest prices and wholesale prices from the minimum support prices were worked out and divided into positive and negative deviations examine where market prices ruled higher or lower over the minimum support prices. The negative deviation reflected ineffectiveness of MSP policy for producers. The formulae used for the mean absolute negative /positive deviation as follows:

MAPD or MAND = 1/n [FHP/WSP – MSP]

If FHP / WSP > MSP = Positive deviation (PD) FHP / WSP < MSP = Negative deviation (ND)

Where,

MAPD = Mean absolute positive deviation,

MAND = Mean absolute negative deviation,

FHP = Farm harvest prices

WSP = Wholesale prices

MSP = Minimum support price and

n = Frequency of positive or negative deviation

These deviations were adjusted with MSP in order to examine the degree of their deviation from MSP. The formulae used the adjusted mean negative/positive deviation was as follows:

AMPD or AMND = 1/n ([FHPi / WSP_i – MSPi] / MSPi)*100

If FHP / WSP > MSP = Positive deviation (PD) FHP/ WSP < MSP = Negative deviation (ND)

Where, AMPD = Adjusted mean positive deviation,

AMND = Adjusted mean negative deviation,

The significance gap between FHP/WSP and MSP of kharif jowar was tasted by two simple t test.

$$t = \frac{(\bar{x} - \bar{y}) - (\mu_x - \mu_y)}{s\sqrt{\frac{1}{n_x} - \frac{1}{n_y}}}$$

Where,

$\bar{x}$ = mean of FHP/WSP of size n_x

$\bar{y}$ = mean of MSP of size n_y

$$s^2 = \frac{(n_x - 1)s_x^2 + (n_y - 1)s_y^2}{(n_x - 1) - (n_y - 1)}$$

Where,

s^2 = pooled variance

n_x = Number of sample of one variable (FHP/WSP)

n_y = Number of sample of one variable (MSP)

s_x = Variance of one variable (FHP/WSP)

s_y = Variance of one variable (MSP)

Impact of Minimum Support Prices (MSPs) on wheat in Maharashtra during 2001-2020

To study the impact of lagged minimum support prices (MPSs) on the acreage allocation, production, and productivity of wheat in Maharashtra, linear and logarithmic. forms of equations have been fitted. The previous year's MSPs generally influence the producer farmer's decision on acreage allocation for the current year. The linear type of equation has been used as:

Linear regression equation

$A_t = a + b\ Pr_{t-1}$

$P_t = a + b\ Pr_{t-1}$

$Y_t = a + b\ Pr_{t-1}$

The logarithmic type of equation was used as:

Logarithmic regression equation

Log A_t = log a + b log Pr_{t-1}

Log P_t = log a + b log Pr_{t-1}

Log Y_t = log a + b log Pr_{t-1}

Where,

A_t = Area of major crops at (t^{th}) period,

P_t = Production of major crops at (t^{th}) period,

Y_t = Productivity of major crops at (t^{th}) period,

P_{rt-1}=MSPs/FHPs and WSPs of major crops taken in per quintal at $(t-1)^{th}$ period.

Linear type of function found a better fit than logarithmic function. Hence it is used.

Results and Discussion

Keeping in view the objectives of the study, the data were analysed using suitable techniques. The results obtained from this study have been presented and discussed.

Growth of area, production, productivity, MSP, FHP and WSP of wheat in Maharashtra during study period.

The Minimum, maximum prices, coefficient of variation and compound growth rates of wheat in Maharashtra during 2001-2020 was shown in below table number 1.

Table 1: Minimum, maximum prices, coefficient of variation and compound growth rates of wheat in Maharashtra. Area in (00 ha.), Production (00 tonnes) and Productivity (Kg/ha)

	Minimum	Maximum	CV (%)	CGR (%)
Wheat				
Area	627.60	1307.00	22.22	1.54***
Production	625.70	2641.10	37.30	2.76***
Productivity	898.00	2021.99	17.49	1.23***

Note: *** and ** denotes significance at 1% and 5% level of significance

The maximum and minimum prices per quintal, coefficient of variation (%) and compound growth rate of wheat is presented in table-1. It is observed from the table-1, that the maximum area of cotton crop over a period of time of the study was 1307.00 thousand hectors, where as minimum area during study period was 627.60 thousand hectors. The coefficient of variation (CV) value for area of cotton crop was 22.22 percent and area under cotton was increased significantly by 1.54 percent per annum during study period. In respect of production maximum production was 2641.10 thousand tonnes and minimum production was 625.70 thousand tonnes respectively. The variability in production was 37.30 percent. The production of cotton was increased by 2.76 percent per annum during study period. The variability in productivity in cotton crop was 17.49 percent and productivity was increased by 1.23 percent over the period of study.

Table 2: Growth rates of WSP AND MSP for the period 1990-91 to 2020-21

Crop	WSP CV (%)	MSP CV (%)	CGR of WSP (%)	CGR of MSP (%)
Wheat	36.17	38.31	6.36***	7.12***

Note: *** denotes significance at 1% level of significance

The growth rates and variability in WSPs and MSPs of the wheat was presented in table-2. From the table 2 it is observed that, the variability in WSPs of the wheat was 36.17 percent. As the variability in WSPs was little most high in wheat of the study, it denotes the volatile in terms of prices. The variability in MSP of the wheat was 38.31 percent. Therefore, it is concluded that large variability in MSP was observed during study period.

The compound growth rates of WSP and MSP were significantly increased over a period of study, but the compound growth rates of MSP (i.e.7.12 percent) were slightly higher than WSP of wheat during the study.

Table 3: Growth rat FHP AND MSP for the period 1990-91 to 2020-21

Crops	FHP CV (%)	MSP CV (%)	CGR of FHP (%)	CGR of MSP (%)
Wheat	39.96	38.31	7.31***	7.12***

Note: *** denotes significance at 1% level of significance

The growth rates and variability in FHP and MSP of wheat crop was presented in table-3. From the table 3 it is seen that, the coefficient of variation (CV) value of FHP was 39.96 percent, on the other hand CV value of MSP was 38.31. Significantly positive growth rates were observed for FHP and MSP of wheat.

Table 4: Gap between Farm Harvest Prices and Minimum Support prices of wheat crop during 2001-2020

Year	Wheat		
	WSP (Rs./qtl)	MSP (Rs./qtl)	Gap Between WSP & MSP(Rs./qtl)
2001-02	678	620	58
2002-03	683	620	63
2003-04	721	630	91
2004-05	741	640	101
2005-06	728	650	78
2006-07	827	750	77
2007-08	838	1000	-162
2008-09	109	1080	18
2009-10	1208	1100	108
2010-11	1384	1120	264
2011-12	1280	1285	-5
2012-13	1424	1350	74
2013-14	1752	1400	352
2014-15	1644	1450	194
2015-16	1706	1525	181
2016-17	1808	1625	183
2017-18	1843	1735	108
2018-19	2074	1840	234
2019-20	2136	1925	211
2020-21	2248	1975	273

Table 5: Gap between Wholesale Prices and Minimum Support prices of wheat crop during 2001-2020

Year	Wheat		
	WSP (Rs./qtl)	MSP (Rs./qtl)	Gap Between WSP & MSP (Rs./qtl)
2001-02	675	620	55
2002-03	914	620	294
2003-04	762	630	132
2004-05	845	640	205
2005-06	758	650	108
2006-07	927	750	177
2007-08	1107	1000	107
2008-09	1176	1080	96
2009-10	1157	1100	57
2010-11	1337	1120	217
2011-12	1590	1285	305
2012-13	1624	135	274
2013-14	1647	1400	247
2014-15	2150	1450	700
2015-16	1750	1525	225
2016-17	1600	1625	-25
2017-18	1720	1735	-15
2018-19	2068	1840	228
2019-20	2306	1925	381
2020-21	1998	1975	23

Table 6: Significance of gap between FHP and MSP of wheat

Crop	Mean FHP	Mean MSP	T value (t-cal.)	t table	D.F.
Wheat	1341	1216	0.79	2.00	38

Note: t cal < t tab that means H_0 is accepted at (5%) level of significance and conclude that the gap between FHP and MSP do not differ significantly

Table 7: Significance of gap between WSP and MSP of wheat

Crops	Mean WSP	Mean MSP	T value (t-cal.)	t table	D.F.
Wheat	1406	1216	1.23	2.00	38

Note: t cal < t tab that means H0 is accepted at (5%) level of significance and conclude that the gap between WSP and MSP do not differ significantly

Table 8: Deviation of FHPs vis-à-vis MSPs of wheat in Maharashtra

Crop	Negative deviation					Positive deviation				
	Frequency	MAND (Rs./qtl)	Range (Rs./qtl)	AMND (Rs./qtl)	%	Frequency	MAPD (Rs./qtl)	Range (Rs./qtl)	AMPD (Rs./qtl)	%
Wheat	2	-83.50	(-5)-(-162)	-8.29	10	18	12.11	18-352	12.11	90

Note: * Zero deviation (FHP=MSP) were consider positive deviation indicating success of the MSP policy Average = Average of the different of FHP from MSP (+ve or -ve) and % = Percentage of average positive or negative deviation over MSP.

Deviation of FHPs from MSPs of wheat in Maharashtra from 2001-2020

To examine the effectiveness of MSP policy of wheat in Maharashtra, difference between its FHP and MSP was calculated in different year. Wheat, experience positive deviation at 18 times in 20 years during study period. This means that the average FHP was very near to or ruled higher than MSP in 20 times out of 20 years. The adjusted difference (positive) between MSP and FHP was as above 90 percent of the MSP and the negative difference was very low.

Table 9: Deviation of WSPs vis-à-vis MSPs of wheat in Maharashtra

Crop	Negative deviation					Positive deviation				
	Frequency	MAND (Rs./qtl)	Range (Rs./qtl)	AMND (Rs./qtl)	%	Frequency	MAPD (Rs./qtl)	Range (Rs./qtl)	AMPD (Rs./qtl)	%
Wheat	2	-19.96	(-15)-(-25)	-1.20	10	18	212.90	23-700	19.54	90

Note: * Zero deviation (FHP=MSP) were consider positive deviation indicating success of the MSP policy Average = Average of the different of FHP from MSP (+ve or -ve) and % = Percentage of average positive or negative deviation over MSP

Deviation of WSPs from MSPs of major wheat in Maharashtra from 2001-2020

To examine the effectiveness of MSP policy of wheat in Maharashtra, difference between its WSP and MSP was calculated in different year. Wheat experience positive deviation at 18 times. This means that the average WSP was very near to or ruled higher than MSP in 18 times out of 20 years during 2001-2020. The adjusted difference (positive) between MSP and WSP was above 90 percent of the MSP and the negative difference was very low. The adjusted different (positive) between MSP and WSP was as about 90 percent of MSP and the negative difference was observed 10 percent in 20 years during 2001-2020.

Impact of Minimum Support Prices (MSPs) on wheat in Maharashtra during 2001-2020

To study the impact of lagged MSP, FHP and WSP on the acreage allocation, production and productivity, linear and logarithmic form of education had found a better fit than logarithmic function; the farmers had been presented here. The previous year MSP, FHP and WSP had been used here since these prices generally influence the farmer's decision on

acreage allocation for the current year.

Impact of MSP on area, production and productivity of wheat in Maharashtra

Impact of MSP on area, production and productivity of wheat in Maharashtra are presented in table-10. The numerical values of the liner function of wheat indicates that R^2 is significant at 1 percent level and supports the results that variation in area, production and productivity of wheat is explained by the explanatory variables, i.e. previous years Minimum Support Prices (MSPs) of the wheat. The result revealed that 35, 41 and 38 percent variation in area, production and productivity of wheat. The elasticity for these variables is significant at 1 percent in case of area, production and productivity of wheat. The value of elasticity has found as 0.235, 0.619 and 0.284 percent indicating thereby that previous year MSP influences current year area, production and productivity wheat.

Table 10: Impact of MSP on area, production and productivity of wheat in Maharashtra

Crop	R^2	S.E. of R	Linear regression equation
Area	0.35	173.06	y = 720.55 +0.235x
Production	0.41	390.02	y = 798.15 + 0.619x
Productivity	0.38	192.9	y = 1161.00 + 0.284x

y = area, production and productivity & x = MSP

Impact of FHP on area, production and productivity of wheat in Maharashtra during 1990-2020

Impact of FHP on area, production and productivity of wheat in Maharashtra are presented in table-11. The numerical values of the liner function indicates that R^2 is significant at 1 percent level and supports the results that variation in area, production and productivity of wheat, is explained by the explanatory variables, i.e. previous years Farm Harvest Prices (FHPs) of the wheat. 32, 39 and 34 percent variation in area, production and productivity, is explained by independent variable i.e. lagged FHP. The elasticity for these variables is significant at 1 percent in case of area, production and productivity of wheat. The value of elasticity has initiate as 0.212, 0.554 and 0.251 percent indicating thereby that previous year FHP influences current year area, production and productivity of wheat.

Table 11: Impact of FHP on area, production and productivity of wheat in Maharashtra

	R^2	S.E. of R	Linear regression equation
Area	0.007	2415.42	y = 8590.55 + 0.377x
Production	0.14	3519.45	y = 8447.56 + 2.556x
Productivity	0.12	1091.89	y = 3941.21 + 0.742x

y = area, production and productivity & x = FHP

Impact of WSP on area, production and productivity of wheat in Maharashtra during 1990-2020

Impact of WSP on area, production and productivity of wheat in Maharashtra are presented in table-12. The numerical values of the liner function of wheat indicates that R^2 is significant at 1 percent level and supports the results that variation in area, production and productivity is explained by the explanatory variables, i.e. previous years Wholesale Prices (WSPs) of the wheat. 28, 33 and 28 percent variation in area, production and productivity, is explained by independent variable i.e. lagged WSP. The elasticity for these variables is significant at 1 percent in case of area, production and productivity of wheat. The value of elasticity

Table 12: Impact of WSP on area, production and productivity of Kharif paddy in Maharashtra

Crops	R^2	S.E. of R	Linear regression equation
Area	0.28	118.45	y = 173.32 + 0.187x
Production	0.33	417.15	y = 841.00 + 0.487x
Productivity	0.28	207.35	y = 1188.30 + 0.216x

y = area, production and productivity & x = WSP has initiate as 0.187, 0.487 and 0.216 percent indicating thereby that previous year WSP influences current year's area, production and productivity of wheat

Conclusion

- The growth in area of wheat stagnant over a period of study and the production growth of the wheat was significantly increased during study period. Productivity growths were considerably increased in wheat.
- As the variability in WSPs was medium in wheat crop of the study, it denotes were volatile in terms of prices and also that regular variability in MSP was observed in wheat during study period.
- The compound growth rates of MSP were slightly higher than WSP of the study. Significantly positive growth rates were observed for FHP and MSP of wheat crop.
- It was observed that, significance gap between FHP, WSP and MSP do not differ significantly. As about the deviation of FHPs, WSPs vis-à-vis MSPs, it was observed that, frequency of negative deviation occurred 2 and 5 times while about positive deviation it was 29 and 26 times of wheat crop respectively.
- The adjusted difference (positive) between MSP and FHP/WSP was as above 93 percent / 83 percent of the MSP and the negative difference was very low.
- It was also observed that, the impact of MSP, FHP and WSP on area, production and productivity is middling under wheat crop during the study period.

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