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Agriculture Model and Measurement of Survival Income in Wheat Cultivating Farmers under Different Land-Holding Categories

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ABSTRACT

The three main crops in the world are rice, maize and wheat. In 2019, India was behind only China in wheat and rice production, while at the seventh position in maize cultivation (FAO statistics). Fifty-nine per cent of the Indian population is engaged in agriculture and contribute 23% of the GDP, 70% of the rural household depends on agriculture, and 82% of the farmer's population belongs to small and marginal farmers. Despite 275 million tonnes of total food grain production in 2017-18, India is a home of 190 million undernourished population (India at a Glance, 2021).

The research focus is to measure the role of Minimum Support Price (MSP) in enhancing the living standards of different categories of agriculture landholders engaged in wheat cultivation, and for analysis purposes, it develops a model relating production cost, the effect of high and low yield on crop income and MSP rate (3 categories at MSP, above 20% of MSP and above 40% of MSP).

Keywords: *Small and Marginal farmers, Minimum Support Price (MSP), Agriculture, Economics, Poverty, Agriculture Land-holdings.*

I. INTRODUCTION

The three main crops in the world are rice, maize and wheat. In 2019, India was behind only China in wheat and rice production, while at the seventh position in maize cultivation (FAO statistics). Fifty-nine per cent of the Indian population is engaged in agriculture and contribute 23% of the GDP, 70% of the rural household depends on agriculture, and 82% of the farmer's population belongs to small and marginal farmers. Despite 275 million tonnes of total food grain production in 2017-18, India is a home of 190 million undernourished population (India at a Glance, 2021).

It is natural that India's Government is concerned about the agriculture sector, which employed such a vast population. The government policies towards the agricultural sector, which include

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subsidies in different forms, require introspection as agricultural and allied activities are not producing expected results like reduction in poverty and enhancement of agriculture farmers living standards, especially in marginal and small agriculture landholders.

The research focus is to measure the role of Minimum Support Price (MSP) in enhancing the living standards of different categories of agriculture landholders engaged in wheat cultivation, and for analysis purposes, it develops a model relating production cost, the effect of high and low yield on crop income and MSP rate (3 categories at MSP, above 20% of MSP and above 40% of MSP).

(A) Literature Review

(Marta Kozicka, 2014) research focuses on food subsidies extended by the Indian government and how MSP affects crop prices in the market. (Lalit Kumar, 2019) also, elaborate on MSP and how it affects Indian farmers.

The present research agrees with (Mehta 2019) that it is necessary to extend benefits to farmers and remove distorted trade mechanisms that make it difficult for agriculture farmers to get a reasonable price for their production.

The relationship between farm size and productivity is studied by (Gollin, 2018) and conclude that yield is not dependent on farm size. The study considers the argument and agrees that productivity requires resources, not just an increment in a farm area. Even my earlier works (Ahmed, Poverty and Deprivation: Study of a most impoverished population for better management of resources, 2021) points out how the rural population suffers in terms of low living standards and survive with limited assets (Ahmed, Multidimensional Poverty Index and Need to Revise the Methodology for Counting Poor, 2018) where development multidimensional poverty index provide additional information and suggest need to revise methodology to count poor on the basis of it. (Ahmed, Inadequate Land Reforms Reason for Poverty and Social Unrest, 2014) world bank conference paper highlights the plight of poor farmers who are waiting for land reforms, and in the absence of it, social unrest is common in the interior regions.

For analysis purposes, data was taken from the Indian government publications and mentioned below the tables for reference purposes. The main statistical reports used are (Cost of Cultivation/Production & Related Data , 2017-18), (Economic Survey 2020-21), (Agriculture Statistics at a Glance 2018, 2019), (India at a Glance, 2021), (Agriculture Census, 2015-16), and (Rangarajan Report on Poverty, 2014). For the latest information on Consumer Price Index (CPI) agriculture and Minimum Support Price (MSP), Indian government press notification is

consulted.

II. THE MASOOD'S INPUT-COST- SURVIVAL MODEL

The input-cost and Survival model is a simple exploration of the production cost associated with crop cultivation. Data for different states was taken from government sources (Cost of Cultivation/Production & Related Data , 2017-18), and for this research, the Wheat crop and the state of Punjab were chosen as it has the highest yield (5188 kgs/ha) in comparison to other Indian states while the state of Sikkim was chosen because it has the lowest yield (1079 Kgs./ha) for comparative analysis. All other states yield is in between these two ranges.

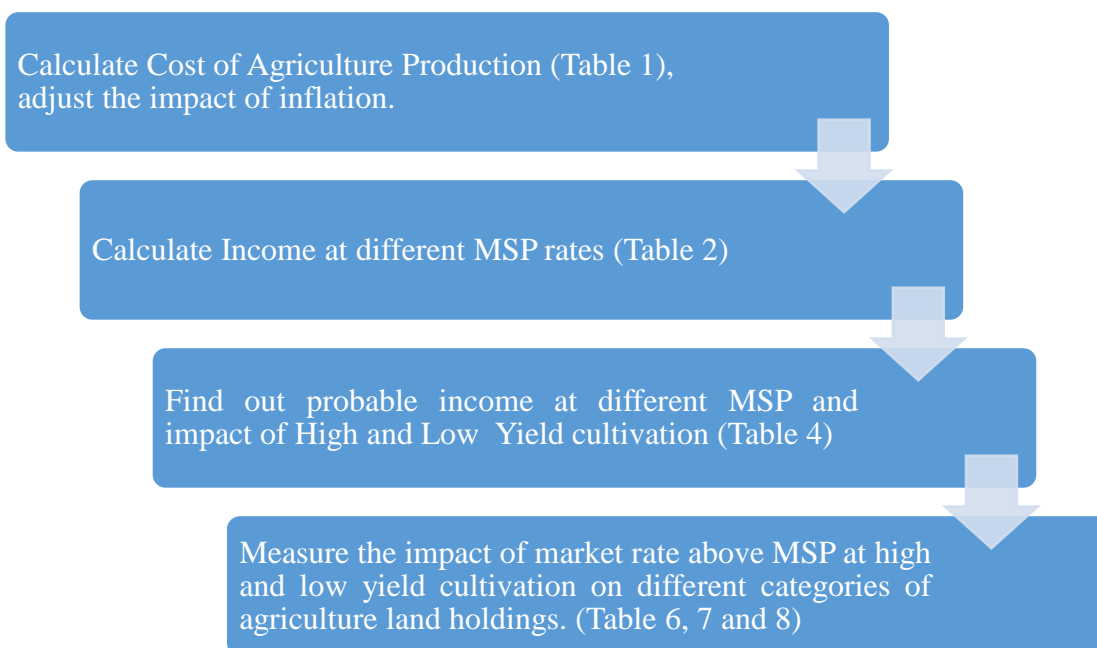
The data provide details on operational cost, which consist of Human Labour (Family, attached and casual), Animal and Machine Labour, purchase of seeds, insecticide, fertilizer and manures, irrigation charges, crop insurance, payment to contractor and interest paid on working capital along with any miscellaneous charges needed for agricultural purposes under variable expenses category. At the same time, fixed cost expenses include rent paid for leased land, tax-related to agricultural land, depreciation on fixed assets, and interest on fixed assets. The Minimum Support Price (MSP) 2021 is taken as the base for calculating income from the cultivation in Table 2, and the cost of production (2017-18) is adjusted for the current level of inflation.

(Gollin, 2018), from IFAD, research point out that yield is not affected much by farm size in India. The profitability depends on farm size due to the law of averages where labour productivity, use of technology, agriculture inputs give an advantage to farmers with the increase in farm size.

The research take's the yield range of 5188-1079 Kgs/ha prevailing in different states and districts. However, the calculation based on the minimum and maximum yield provides the wide income gap between the wheat cultivating farmers, who belong to different states, regions, and different quality, sizes, and are with or without irrigation facilities in their agricultural landholdings.

Survival income denotes efforts by the farmer and his family, through which the family saves the amount they need to pay to outsiders during the process of agriculture production. It is the income that keeps a farmer to continue the occupation instead of moving to other areas. In the absence of survival income, if he sells the produce at MSP, the probability of loss is high.

III. WORKING OF THE MODEL



IV. RESULTS

1 The marginal farmers' population with 99.85 million agriculture holdings makes a strong case for reform, as in the absence of just income, they are forced to sell their land and work as farms or manual labour in the unorganized sector.

2 At the MSP rate (Table 6), marginal farmers remain in extreme poverty under both types of cultivation (High and Low yield). In contrast, other categories (Small, semi-medium, medium and large) are in the safe category if they can get cultivation at higher yield while farmer with average landholding is in a vulnerable condition. In lower yield cultivation, only farmers with large landholdings are in moderate poverty, and all other categories suffer under extreme poverty.

3 When the farmers are getting a market price above 20% of the MSP rate (Table 7), at a higher yield, all categories except marginal farmers can generate safe income, while marginal farmers still suffer under moderate poverty. If farmers cultivation is under low yield variety, except medium and large, all other categories remain in an extreme poverty situation, whereas medium farmers move into moderate poverty and large landholders are only in the safe category.

4 In case farmers can get a price above 40% of the government's declared MSP rate (Table 8), at higher yield cultivation, all categories except marginal farmers are in a safe income zone, whereas marginal farmers are under moderate poverty. If farmers suffer from low yield, only

large landholders are safe, while medium farmers are vulnerable, and the rest remain in extreme poverty.

V. CONCLUSION

In case farmers suffer from low yield, marginal, small, semi-medium, and average landholders remain in extreme poverty even if they are given a market rate above 40% of the MSP. At the same time, medium-size farmers will be vulnerable, while large scale farmers with low yields are in a safe zone even if they get a market price of more than 20% of the MSP.

The analysis concludes that at the current price and landholding patterns, even a market price above 40% of the MSP is insufficient for five categories: marginal, small, semi-medium, medium and average if they suffer from low yield for any reason. Large scale farmers are beneficiaries due to the law of average as they are able to generate distributive income sufficient for them to keep them above the poverty level.

(Agriculture Statistics at a Glance 2018, 2019) data provide details availability of irrigation facilities for different categories of landholders. It tells that only 42% of marginal landholdings have access to irrigation facilities, and only 35% of small farmers belong to this. In the absence of irrigation facilities, high yield varieties to grow with proper availability of fertilizer and insecticide to protect, it is not easy to achieve profitable production. Also, different states face different environmental conditions, and crop production and distribution depend on available infrastructure for a reasonable price.

In (Rangarajan Report on Poverty, 2014) report Rs. 4,860 per month is mentioned as the poverty line for a family of five members residing in a rural area. On adjusting the inflation rate for the period, the income at the current price should be Rs. 5,931.63 per month in rural areas. The income at the current level is above the extreme poverty line but less than the moderate poverty level. Hence even the report validate the research findings and support the need to reform the agriculture sector.

The research supports applying government schemes that act as the safety net for marginal and small farmers and necessary subsidies for agriculture inputs to make the cultivation cost-efficient and competitive. In the absence of it, farmers with marginal and small landholdings suffer the most.

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Table 1: Cost of Production				
			Prices: 2017-18 In Rs./ha	Inflation adjusted Cost of production Prices: 2020-21 Rs./ha.
1.1.1	Human Labour	Family	2930.21	3105.10
1.1.2		Attached	597.03	632.66
1.1.3		Casual	1865.08	1976.40
1.1.4		Total	5392.32	5714.16
1.2.1	Animal Labour	Hired	6.12	6.49
1.2.2		Owned	22.17	23.49
1.2.3		Total	28.29	29.98
1.3.1	Machine Labour	Hired	7322.02	7759.03
1.3.2		Owned	2630.80	2787.82
1.3.3		Total	9952.82	10546.85
1.4	Seed		2550.81	2703.05
1.5.1	Fertilizer & Manure	Fertilizer	5259.71	5573.63
1.5.2		Manure	46.45	49.22
1.5.3		Total	5306.16	5622.86
1.6	Insecticides		1841.49	1951.40
1.7	Irrigation Charges		660.65	700.08
1.8	Crop Insurance		0.00	0.00
1.9	Payment to Contractor		0.00	0.00
1.10	Miscellaneous		66.27	70.23
1.11	Interest on Working Capital		714.63	757.28
1	Operational Cost (Total)		26513.44	28095.89
2.1	Rental Value of Owned Land		28444.57	30142.28
2.2	Rent Paid For Leased-in-Land		4920.81	5214.51
2.3	Land Revenue, Taxes, Cesses		0.00	0.00
2.4	Depreciation on Implements & Farm Building		1043.16	1105.42
2.5	Interest on Fixed Capital		4770.57	5055.30
2	Fixed Costs (Total)		39179.11	41517.50
3	Total Cost [1+2]		65692.55	69613.39
	Adopted from: DIRECTORATE OF ECONOMICS & STATISTICS, INDIA (2017-18)			
	Average Per hectare production is between Rs.5188 -1079 kgs in different Indian States			
	Adjusting impact of inflation (5.16%) increase in agricultural production prices between 2018 to 2021			
	Operational Cost = (1.1.4+1.2.3+1.3.3+1.4+1.5.3+1.6+1.7+1.8+1.9+1.10+1.11)			
	Fixed Cost= 2.1+2.2+2.3+2.4+2.5			

	Income	Income at MSP	20% increase in SP over MSP	40% increase in SP over MSP
a1	Total Cost from table 1	69613.39	69613.39	69613.39
a2	MSP per Quintal	1975	2370	2765
a3	MSP per kg	19.75	23.7	27.65
a4	Present Per hactor production in Kg (source RBI)	5188	5188	5188
a5	Income= (a3*a4)	102463	122955.6	143448.2
a6	by product value per ha.	8461.55	8461.55	8461.55
a7	Total Income Per Ha (a5+a6)	110924.55	131417.15	151909.75
a8	Farmer Profit/Loss (a7 - a1)	41311.16	61803.76	82296.36
	Survival Income & Savings			
b1	Human Labour	5714.16	5714.16	5714.16
b2	Payment to Contractor	0.00	0.00	0.00
b3	Rental Value of Owned Land	30142.28	30142.28	30142.28
b4	Depreciation on Implements & Farm Building	1105.42	1105.42	1105.42
b5	Interest on Fixed Capital	5055.30	5055.30	5055.30
b6	Total Suvival Savings (b1+b2+b3+b4+b5)	42017.15	42017.15	42017.15
	Possible range of Income			
c1	Survival Income (a7+b6)	152941.70	173434.30	193926.90
d1	Disposable Income (c1 - a1)	83328.32	103820.92	124313.52

Table 3: International Poverty Criteria

Poverty (World Bank)		Less than(\$)	\$1=Rs 73.6	Per month (Rs)
Extreame Poverty	per day	1.9	139.84	4195.2
Moderate Poverty	per day	3.1	228.16	6844.8
Vulnurable	per day	5.5	404.8	12144

Table 4: Income range (High (Rs. 5188 per ha) and Low (Rs. 1079 per ha)) yield and at different MSP

	Wheat Cultivation 210-240 days (7-8 months)		
	Min. Support Price	20% increase in SP over MSP	40% increase in SP over MSP
	Net Income	Net Income	Net Income
Total income from cultivation (Rs.) from Highest Yield (Rs 5188) in Punjab	83328.32	103820.92	124313.52
Per Month Income (Rs.)	10416.04	12977.61	15539.19
Total income from cultivation (Rs.) Min. Yield (Rs. 1079) in Sikkim	2175.57	6437.62	10699.67
Per Month Income (Rs.)	271.95	804.70	1337.46

Table 5: Categories of Land-Holdings (All India)

	Year 2015-16	%	Area	Avg. Size
Marginal (Less than 1 hectare)	99858000	68.52	37960	0.38
Small (1.0 to 2.0 hectares)	25777000	17.69	36435	1.41

Semi-Medium (2.0 to 4.0 hectares)	13776000	9.45	37168	2.7
Medium (4.0 to 10.0 hectares)	5485000	3.76	31367	5.72
Large (10.0 hectares and above)	831000	0.57	14212	17.1
Total	145727000	100	157142	1.08

Adapted from: Department of Agriculture, Cooperation & Farmers Welfare (Agriculture Census 2015-16, Phase-I)

Area Operated: ('000 Hectares)

Average size: (Hectares)

Table 6: Income-based on MSP at High and Low Yield

	Avg. Size	Monthly Income at higher yield	Poverty Status (Higher Side)	Monthly Income at Lower yield	Poverty Status (Lower Side)
Marginal (Less than 1 hectare)	0.38	3958.09	EP	103.34	EP
Small (1.0 to 2.0 hectares)	1.41	14686.6	S	383.44	EP
Semi-Medium (2.0 to 4.0 hectares)	2.7	28123.3	S	734.25	EP
Medium (4.0 to 10.0 hectares)	5.72	59579.7	S	1555.53	EP
Large (10.0 hectares and above)	17.1	178114	S	4650.27	MP
Average Holdings	1.08	10416.04	V	293.70	EP

Extreme Poverty=EP, less than \$1.9 per day or Rs. 4195.02 per month

Moderate Poverty=MP, less than \$3.1 per day or Rs.6844.8 per month

Vulnerable =V, less than \$5.5 per day or Rs. 12144 per month

Safe=S

Table 7: Income, when the market rate is 20% above MSP

	Avg. Size	Monthly Income at higher yield	Poverty Status (Higher Side)	Monthly Income at Lower yield	Poverty Status (Lower Side)
Marginal (Less than 1 hectare)	0.38	4931.49	MP	305.79	EP
Small (1.0 to 2.0 hectares)	1.41	18298.44	S	1134.63	EP
Semi-Medium (2.0 to 4.0 hectares)	2.7	35039.56	S	2172.70	EP
Medium (4.0 to 10.0 hectares)	5.72	74231.95	S	4602.90	MP
Large (10.0 hectares and above)	17.1	221917.21	S	13760.40	S
Average Holdings	1.08	14015.82	S	869.08	EP

Extreme Poverty=EP, less than \$1.9 per day or Rs. 4195.02 per month

Moderate Poverty=MP, less than \$3.1 per day or Rs.6844.8 per month

Vulnerable =V, less than \$5.5 per day or Rs. 12144 per month

Safe=S

Table 8: Income, when the market rate is 40% above MSP					
	Avg. Size	Monthly Income at higher yield	Poverty Status (Higher Side)	Monthly Income at Lower yield	Poverty Status (Lower Side)
Marginal (Less than 1 hectare)	0.38	5904.89	MP	508.23	EP
Small (1.0 to 2.0 hectares)	1.41	21910.26	S	1885.82	EP
Semi-Medium (2.0 to 4.0 hectares)	2.7	41955.81	S	3611.14	EP
Medium (4.0 to 10.0 hectares)	5.72	88884.16	S	7650.26	V
Large (10.0 hectares and above)	17.1	265720.14	S	22870.54	S
Average Holdings	1.08	16782.32	S	1444.45	EP

Extreme Poverty=EP, less than \$1.9 per day or Rs. 4195.02 per month

Moderate Poverty=MP, less than \$3.1 per day or Rs.6844.8 per month

Vulnerable =V, less than \$5.5 per day or Rs. 12144 per month

Safe=S
