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Impact of farm mechanization subsidies on farmers

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Abstract

The present study entitled "Impact of Farm Mechanization Subsidies on Farmers" carried out in Kagal, Karveer, and Hatkangle tehsils of Kolhapur district, Maharashtra. A total 150 respondent farmers selected who had availed subsidy through a simple random sampling method and personally interviewed with the help of a structured and pre-tested interview schedule. The research was conducted in Kolhapur district of Maharashtra, India, where sugarcane is a dominant cash crop, and use mechanization on various level of farming. The study followed an ex-post facto research design as the variables under investigation had already occurred and could not be manipulated.

A structured interview schedule covering major aspects for assessment of the impact of farm mechanization subsidy on farmers in terms of change in adoption of farm machinery, reduction in input use cost, change in crop productivity, change in income and change in livelihood after availing subsidy. Based on the composite impact scores, the farmers were classified into three categories: low, medium and high. Results revealed that a majority (39.33%) of the respondents possessed a medium level of impact, followed by 32.67 percent with low impact, while 28.00 percent had a high level of impact. This distribution clearly reflects a significant balance among farmers, particularly in technical aspects such as market efficiency, income management, and adoption of mechanization to use inputs, employment generation.

The findings highlight the need for ensuring timely approval and release of subsidy amount, conducting awareness programmes and extension activities regarding subsidy schemes at the village level. Strengthen co-ordination between agriculture department, banks, and machinery dealers. Overall, the study emphasizes that agricultural subsidies, particularly farm mechanization subsidies, have positively contributed towards increasing adoption of modern machinery, reducing production costs, improving productivity, enhancing income and livelihood of farmers

Keywords: Farm mechanization, impact of, respondent farmers, subsidy, change in adoption, cost reduction in input use, change in productivity, change in income, change in livelihood

Introduction

Farm mechanization has emerged as a critical strategy for improving efficiency, reducing hard work, and enhancing timely farm operations. Recognizing this, the Government of India and the state of Maharashtra have implemented various subsidy schemes to promote the adoption of farm machinery, especially among small, marginal, and resource-poor farmers. These subsidies aim to reduce the capital burden on farmers, encourage the use of modern technology, and bridge the mechanization gap between regions. Maharashtra, being an agrarian state with varied Agro-climatic zones, Government provides various subsidies to promote agricultural productivity for farmer's welfare. Despite the policy push, the reach and impact of such subsidies remain a matter of concern, influenced by factors such as awareness, accessibility, bureaucratic procedures, and farmer eligibility. To systematically assess farm mechanization impact, a structured tool consisting of 40 validated statements was designed in consultation with subject matter specialists. Farmers' responses were taken as before mechanization and

after mechanization which is categorized into three groups: Agree, Undecided and Disagree. The study evaluated impact across five key thematic areas: adoption, cost reduction in input use, crop productivity, income and livelihood. Together, these domains reflect a comprehensive impact of farm machinery for preserving soil fertility and preventing degradation (FAO, 2017). Kolhapur district of Maharashtra, and provide the financial assistance to small and marginal farmers in Maharashtra to produce more efficiently. Findings from such studies are crucial for guiding extension systems and policymakers in developing need-based training and capacity-building initiatives. Strengthening farmer financially gives them a security to try various other mechanized machinery and fulfill the needs of family (Verma & Singh, 2023; ICAR, 2022) ^[12].

Methodology

The present study was conducted in Kolhapur district of Maharashtra, which holds a prominent position in the state's sugarcane production and use mechanization. The tehsils of

Kolhapur district Kagal, Karveer, and Hatkanangle, were deliberately selected as the study area owing to their extensive sugarcane cultivation, high productivity, and better access to irrigation facilities. An ex-post facto research design was employed for the investigation. Kolhapur district consists of twelve tahsils: Karveer, Shahuwadi, Panhala, Hatkanangle, Shirol, Radhanagari, Kagal, Bhudargad, Chandgad, Ajra, Gaganbawda and Gadhinglaj. Among these Kagal, Karveer and Hatkanangle purposively selected based on the predominance of mechanization and beneficiaries of mechanization subsidies. From each of these tehsil's five villages were identified based on the number of mechanization subsidies beneficiaries, making a total of 15 villages. A simple random sampling technique used to select 10 respondent farmers from each village, resulting in a total sample size of 150 respondents for the study.

Results and Discussion

1. Overall impact of farm mechanization subsidy

As described in the previous paragraph on methodology, the impact farm mechanization subsidy was studied by examining changes in specific factors related to overall productivity and livelihood. In this research, the impact is considered as the dependent variable and was measured through changes which includes: A) Change in Adoption B) Cost reduction in Input use C) Change in Productivity D) Change in Income E) Change in Livelihood. These changes were calculated in terms of percentage to assess the effectiveness of farm mechanization subsidy in improving the overall performance of respondent farmers.

To assess this, a structured impact statement was developed in consultation with subject matter specialists, incorporating 40 validated statements covering all essential aspects of impact of mechanization on farmers before mechanization and after mechanization. The responses were categorized as Agree, Undecided, and Disagree to measure the depth of change among respondent farmers.

1.1 Change in adoption

Table 1.1: Classification of respondents according to their overall Change in Adoption

Sr. No.	Category	Score	Frequency (N=150)	Percentage (%)
1.	Low	Up to 33	58	38.67
2.	Medium	34 to 67	56	37.33
3.	High	68 and above	36	24.00
Total			150	100.00
Range=33.33			L=00.00	H =100

Table no. 1.1 represent the classification of respondent farmers according to their overall change in the adoption as the more than one -third (38.67%) of the respondent had low level of change in adoption, followed by 37.33 per cent of the respondent farmers who had medium level of adoption and remaining 24.00 per cent had high level of the adoption change. There is a 38.67 per cent difference in adoption among respondent farmers after mechanization over before mechanization, which clearly demonstrates the impact of the

farm mechanization subsidy. The findings confirm that when farmers are guided and supported through subsidies, they not only acquire knowledge but are also motivated to adopt improved modern technologies effectively.

1.2 Cost reduction in Input use

Table 1.2: Classification of respondents according to their overall Cost reduction in Input use

Sr. No.	Category	Score	Frequency (N=150)	Percentage (%)
1.	Low	Up to 33	60	40.00
2.	Medium	34 to 67	49	32.67
3.	High	68 and above	41	27.33
Total			150	100.00
Range=33.33			L=00.00	H =100

Table no. 1.2 presents the distribution of respondent farmers based on their overall level of reduction in input costs after availing the farm mechanization subsidy. The findings show that (40.00%) of the respondent experienced a low level of cost reduction in input use, while 32.67 per cent fell under the medium category. Further 27.33 per cent of the respondents reported a high level of reduction in input costs.

The results indicate that a larger proportion of farmers achieved low to moderate savings in production expenses, whereas slightly more than one-fourth realized noticeable cost reduction. This suggests that the use of farm mechanization helped farmers reduce expenditure on major farm operations such as land preparation, sowing and tillage, although the magnitude of cost savings differed depending on the type of machinery used, farm size, cropping pattern, and the extent of machinery utilization.

1.3 Change in Productivity

Table 1.3: Classification of respondents according to their overall Change in Productivity

Sr. No.	Category	Score	Frequency (N=150)	Percentage (%)
1.	Low	Up to 33	58	38.67
2.	Medium	34 to 67	69	46.00
3.	High	68 and above	23	15.33
Total			150	100.00
Range=33.33			L=00.00	H =100

Table no. 1.3 illustrates the distribution of the respondent farmers according to their overall improvement in productivity after availing the farm mechanization subsidy. The findings indicate that (46.00%) of the respondents fell under the medium level of crop improvement, followed by 38.67 per cent under the low category, whereas 15.33 per cent were classified under the high category. This indicates that most of the respondents experienced a moderate enhancement in crop yield, while only a limited proportion recorded a high level of improvement

1.4 Change in Income

Table 1.4: Classification of respondents according to their overall Change in Income

Sr. No.	Category	Score	Frequency (N=150)	Percentage (%)
1.	Low	Up to 33	50	33.33
2.	Medium	34 to 67	62	41.34
3.	High	68 and above	38	25.33
Total			150	100.00
Range=33.33			L=00.00	H =100

In table no. 1.4 showed that the change in income of farmers after availing farm mechanization subsidy was studied and the respondents were categorized into low, medium and high income change group

The findings revealed that (41.34%) of the respondents belonged to the medium change in income category, followed by 33.33 per cent of the respondents who reported a low change in income. Whereas, 25.33 per cent of the farmers were observed in the high change in income category.

1.5 Change in Livelihood

Table 1.5: Classification of respondents according to their overall Change in Livelihood

Sr. No.	Category	Score	Frequency (N=150)	Percentage (%)
1.	Low	Up to 33	43	28.67
2.	Medium	34 to 67	68	45.33
3.	High	68 and above	39	26.00
Total			150	100.00
Range=33.33			L=00.00	H =100

This table 1.5 indicate the change in livelihood of farmers after availing farm mechanization subsidy was studied and the respondents were categorized into low, medium and high income change group

The findings revealed that (45.33%) of the respondents belonged to the medium change in income category, followed by 28.67 per cent of the respondents who reported a low

change in income. Whereas, 26.00 per cent of the farmers were observed in the high change in livelihood category.

1.6 Overall Impact of farm mechanization subsidy on farmer

Table No.1.6: Classification of respondents according to their overall Impact of farm mechanization

Sr. No.	Category	Score	Frequency (N=150)	Percentage (%)
1.	Low	Up to 36	49	32.67
2.	Medium	37 to 59	59	39.33
3.	High	60 and above	42	28.00
Total			150	100.00
Range= 22.93			L= 13.37	H = 82.16

Table no. 1.6 indicated that, overall impact of farm mechanization subsidy on the respondent was assessed by considering various impact dimensions such as change in adoption of farm machinery, reduction in input use, change in crop yield, and change in income after availing the subsidy. Based on the overall impact score, the respondents were classified into three categories of impact groups.

The findings revealed that the majority of the respondents (39.33%) were categorized under the medium impact group, then by 32.67 per cent of the respondents who belonged to the low impact category. Where 28.00 per cent of the respondents were observed in the high category of impact

Table 1.7: Statement wise response of respondents according to the Overall impact of Farm mechanization.

Sr. No.	Statement		Agree	Undecided	Disagree
A) Change in Adoption					
1	Farm mechanization practices are used in my daily routine of agricultural activities	Before	31 (20.67)	31 (20.67)	88 (58.67)
		After	94 (62.67)	26 (17.33)	30 (20.00)
2	Farm operations are carried out using both traditional and mechanical methods	Before	42 (28.00)	33 (22.00)	75 (50.00)
		After	85 (56.67)	31 (20.67)	34 (22.67)
3	The area of land increased on which farm machinery operations are carried out	Before	22 (14.67)	32 (21.33)	96 (64.00)
		After	78 (52.00)	29 (19.33)	43 (28.67)
4	Mechanical tools are used for land preparation, sowing and harvesting.	Before	41 (27.33)	20 (13.33)	89 (59.33)
		After	112 (74.67)	17 (11.33)	21 (14.00)
5	I tried growing different types of crops in the field	Before	28 (18.67)	25 (16.67)	97 (64.67)
		After	83 (55.33)	37 (24.67)	30 (20.00)

6	I avoid using traditional methods as they are more time taking to regulate in farm than farm machinery operations	Before	71	45	34
			(47.33)	(30.00)	(22.67)
		After	88	35	27
			(58.67)	(23.33)	(18.00)
7	I use mechanized sprayers for plant protection operations	Before	21	45	84
			(14.00)	(30.00)	(56.00)
		After	100	33	17
			(66.67)	(22.00)	(11.33)
8	The extent of mechanization on my farm is more	Before	24	35	91
			(16.00)	(23.33)	(60.67)
		After	97	36	17
			(64.67)	(24.00)	(11.33)
	B) Cost reduction in Input use				
1	The expenditure on seeds has reduced due to efficient seed utilization	Before	35	21	94
			(23.33)	(14.00)	(62.67)
		After	82	33	35
			(54.67)	(22.00)	(23.33)
2	The cost of fertilizer application has reduced as fertilizer loss during field application have decreased	Before	39	28	83
			(26.00)	(18.67)	(55.33)
		After	91	24	35
			(60.67)	(16.00)	(23.33)
3	The precise spraying technique is used to reduce expenditure on pesticides	Before	40	25	85
			(26.67)	(16.67)	(56.67)
		After	70	44	36
			(46.67)	(29.33)	(24.00)
4	Timely completion of farm operation has helped to avoid additional cost.	Before	38	33	79
			(25.33)	(22.00)	(52.67)
		After	86	41	23
			(57.33)	(27.33)	(15.33)
5	Expenditure on repeated tillage and intercultural operation is less	Before	28	46	76
			(18.67)	(30.67)	(50.67)
		After	94	36	20
			(62.67)	(24.00)	(13.33)
6	Expenditure on agricultural inputs has remained unchanged despite the use of improved technologies	Before	19	59	72
			(12.67)	(39.33)	(48.00)
		After	84	38	28
			(56.00)	(25.33)	(18.67)
7	Better input management is done by me on the farm to reduce unnecessary expenses	Before	25	47	78
			(16.67)	(31.33)	(52.00)
		After	92	42	16
			(61.33)	(28.00)	(10.67)
8	Maintenance costs of machinery is high so it affect my expenses	Before	30	42	78
			(20.00)	(28.00)	(52.00)
		After	87	37	26
			(58.00)	(24.67)	(17.33)
	C) Change in Productivity				
1	I can manage to do timely sowing which improved my crop germination and yield	Before	37	33	80
			(24.67)	(22.00)	(53.33)
		After	98	30	22
			(65.33)	(20.00)	(14.67)
2	I use machinery for weeding and inter culture to reduce crop loss.	Before	52	39	59
			(34.67)	(26.00)	(39.33)
		After	92	30	28
			(61.33)	(20.00)	(18.67)
3	Grain loss after harvesting is less	Before	26	37	87
			(17.33)	(24.67)	(58.00)
		After	91	18	41
			(60.67)	(12.00)	(27.33)
4	I am able to do timely plant protection operation which increases my crop yield	Before	30	34	86
			(20.00)	(22.67)	(57.33)
		After	79	34	37
			(52.67)	(22.67)	(24.67)
5	I am able to cultivate high yielding varieties with help of mechanization	Before	27	23	100
			(18.00)	(15.33)	(66.67)
		After	77	43	30
			(51.33)	(28.67)	(20.00)

6	The quality and uniformity of my crop is good	Before	23	40	87
			(15.33)	(26.67)	(58.00)
		After	85	24	41
			(56.67)	(16.00)	(27.33)
7	by using traditional method my crop yield remain unchanged	Before	77	26	47
			(51.33)	(17.33)	(31.33)
		After	32	35	83
			(21.33)	(23.33)	(55.33)
8	Use of machinery in farm led to less crop wastages	Before	95	18	37
			(63.33)	(12.00)	(24.67)
		After	84	17	49
			(56.00)	(11.33)	(32.67)
	D) Change in Income				
1	Efficient working of farm machinery has influenced my income	Before	41	52	57
			(27.33)	(34.67)	(38.00)
		After	96	37	17
			(64.00)	(24.67)	(11.33)
2	I sell my crop earlier at better price than others in market	Before	25	34	91
			(16.67)	(22.67)	(60.67)
		After	78	50	22
			(52.00)	(33.33)	(14.67)
3	I grow various type of crop due to high profit return	Before	40	24	86
			(26.67)	(16.00)	(57.33)
		After	77	39	34
			(51.33)	(26.00)	(22.67)
4	I can use my money on purchasing other machineries than on manual labor	Before	17	34	99
			(11.33)	(22.67)	(66.00)
		After	89	36	25
			(59.33)	(24.00)	(16.67)
5	I can save my time on the farm operation by the help of machinery which can utilize to do other business	Before	49	27	74
			(32.67)	(18.00)	(49.33)
		After	98	31	21
			(65.33)	(20.67)	(14.00)
6	Evenly use of seeds and fertilizers cut my cost and raise profit	Before	18	31	101
			(12.00)	(20.67)	(67.33)
		After	80	41	29
			(53.33)	(27.33)	(19.33)
7	Over the time my dependency on moneylenders is reduced	Before	33	51	66
			(22.00)	(34.00)	(44.00)
		After	101	27	22
			(67.33)	(18.00)	(14.67)
8	My net income reduced due to high fuel,repair and maintenance costs	Before	25	39	86
			(16.67)	(26.00)	(57.33)
		After	34	41	75
			(22.67)	(27.33)	(50.00)
	E) Change in Livelihood				
1.	Employment generation through machinery renting and repair work	Before	48	34	68
			(32.00)	(22.67)	(45.33)
		After	84	31	35
			(56.00)	(20.67)	(23.33)
2.	Improved quality of life due to better access to education, healthcare, and household amenities	Before	56	32	62
			(37.33)	(21.33)	(41.33)
		After	89	30	31
			(59.33)	(20.00)	(20.67)
3.	Improved decision making ability regarding farm management practices	Before	60	30	60
			(40.00)	(20.00)	(40.00)
		After	87	32	31
			(58.00)	(21.33)	(20.67)
4.	Enhanced food and nutritional security for family through stable and timely crop production	Before	55	36	59
			(36.67)	(24.00)	(39.33)
		After	83	31	36
			(55.33)	(20.67)	(24.00)
5.	Greater resilience to labour shortages during peak agricultural seasons	Before	70	25	55
			(46.67)	(16.67)	(36.67)
		After	90	30	30
			(60.00)	(20.00)	(20.00)

6.	Increased social status and confidence within the farming community due to ownership of modern machinery	Before	44 (29.33)	39 (26.00)	67 (44.67)
		After	85 (56.67)	29 (19.33)	36 (24.00)
7.	Strengthened livelihood security by reducing production risks and increasing stability	Before	51 (34.00)	37 (24.67)	62 (41.33)
		After	88 (58.67)	31 (20.67)	31 (20.67)
8.	Greater participation in commercial farming, with shifting from subsistence farming to market oriented production	Before	46 (30.67)	38 (25.33)	66 (44.00)
		After	84 (56.00)	32 (21.33)	34 (22.67)

(Parentheses indicates percentage)

Conclusion

The majority of the respondents belonged to the middle age group, had secondary education, nuclear family, majority of the respondent were only farming as their occupation, small to marginal land holdings, majority of the respondents use river as their source of irrigation and had medium level of annual income. Most of them had medium levels of social participation, mass media utilization, risk preference, and had high level of economic motivation. The majority showed a low level of adoption and cost reduction in input use, while nearly half of the respondents had a medium level of change in Productivity, Income, and Livelihood. Overall majority of the respondent had medium level of the impact regarding farm mechanization subsidy.

The findings of the study reveal that the farm mechanization subsidies programme has positively influenced farmers by increasing the use of modern farm machinery, reducing production costs, improving crop yield, and enhancing farm income. However, as most respondents experienced a medium level of impact, there is a need to improve the effectiveness of the programme. Simplifying the subsidies application process, ensuring timely approval and disbursement, reducing documentation, and expanding Custom Hiring Centers can help improve farmers' access to mechanization, particularly for small and marginal farmers.

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