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Constraints and suggestions of farm mechanization subsidies by the farmers

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Abstract
The present study entitled "Constraints and Suggestions of Farm Mechanization Subsidies by The 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 machineries to use inputs, employment generation.

The study observed that independent variables i.e., age, education, type of family, occupation, social participation, annual income, size of land holding, cropping pattern, source of irrigation, mass media utilization, risk preference and economic motivation were positively correlated with the impact of farm mechanization subsidy. Among these risk preference and economic motivation exhibited positive and highly significant association with impact of mechanization subsidy. In contrast, the variables such as type of family and source of irrigation showed a positive but non-significant association with impact of farm mechanization subsidies

It observed from study that, the delay in approval and sanction of subsidy (63.33%) was the major constraint, rank first. This followed by Delay in subsidy disbursement (52.66%), which was rank second. The third major constraint was the Requirement of high initial investment before receiving subsidy. (47.33%) In the present study, it revealed that large majority (80.66%) of respondent farmers suggested to Ensure timely approval and release of subsidy amount, rank first. Simplify the documentation and application procedure (68.66%) rank second and Increase subsidy amount or provide higher assistance to small and marginal farmers (64.66%) rank third.

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

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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 assisatance 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 fullfill the needs of family (Verma & Singh, 2023; ICAR, 2022) [1].

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 beneficieries of mechanization subsidies. From each of these tehsil's five villages were identified based on the number of mechanization subsidies beneficieries, 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 disscussion

Relationship between profile of the respondent farmers and impact of farm mechanization subsidy

To determine the relationship between independent and dependent variables, the Karl Pearson's correlation coefficient (r), was calculated. Twelve independent variables, which divided into (i) personal, (ii) socio-economic, (iii) communicational, (iv) psychological characteristics used to compute the correlation coefficient for impact of farm mechanization subsidy on respondents. The information regarding this depicted in Table 1.

1. Age with impact

   The findings in Table No.1 illustrated that, the farmers' age and impact of farm mechanization were positively and significantly correlated (r = 0.167*). Accordingly, the null hypothesis, which states "age and impact of farm mechanization subsidy do not significantly correlate," was rejected.

   We concluded that, there was significant correlation between the farmers' age and Impact. The results show that impact of mechanization changes as per their age

2. Education with impact

   The data found in Table No.1 showed that, the farmers' education and Impact of farm mechanization subsidy were positively and significantly correlated (r = 0.178*) The null hypothesis, according to which "education and impact of farm mechanization subsidy do not significantly correlate," therefore rejected.

   This indicates that as the educational level of the respondents increased, their ability to understand, absorb, and retain the information about the farm machinery use also improved. Educated farmers are more receptive to new information and can better interpret and apply it in practical situations.

   It concludes that, farmers' education positively and significantly correlated with their degree of impact. The association's findings showed that farmers' impact of mechanization increased in direct proportion to their level of education.

3. Type of family with impact

   The data included in Table No.1 revealed that, the type of family and impact of farm mechanization subsidy had a positive but no significant correlation (r = 0.029NS) The null hypothesis, according to which "type of family and impact of farm mechanization do not significantly correlate," therefore accepted.

   We conclude that, impact of mechanization positively but no significantly correlated with their type of family. This indicates that the impact of farm mechanization is unaffected by the type of family

4. Occupation with impact

   The data outlined in Table No.1 found that, the farmers' occupation and impact of farm machinery subsidy were positively and significantly correlated (r = 0.182*). The null hypothesis, according to which "occupation and Impact of farm mechanization do not significantly correlate," was thus rejected.

   We can conclude that there was positive and significant correlation between occupation and impact. The findings indicate that farmers' occupation affects the impact of mechanization with subsidy.

5. Social participation with impact

   As seen from Table No.1 reveals that, there is a significant and positive relationship (r = 0.196*) between social participation and the impact.

   This suggests that farmers who are actively involved in social organizations, self-help groups, or community activities are more likely to interact with peers, extension personnel, and other stakeholders. Such interaction provides more opportunities to exchange information, discuss farming practices, and gain exposure to new technologies.

   Increased social interaction acts as a channel for informal learning and reinforces the modern mechanical practices in farm. Therefore, higher social participation contributes to enhanced impact.

   Hence, the null hypothesis stating "There is no relationship between social participation and impact of farm mechanization" is rejected.

6. Annual income with impact

   The data in Table No.1 indicated that, annual income of the respondent farmers and the impact were positively and significantly correlated (r = 0.188*) The null hypothesis, "impact of mechanization and land holding sizes do not significantly correlate," therefore rejected.

   We found that impact was positive and significantly correlated with annual income. According to the positive correlation, farmers who earn more money are able to access more resources and mechanization on the farm.

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7. Size of landholding with impact

The findings in Table No.1 found that, there was a positive and significant association (r = 0.186*) between size of landholding and impact of farm mechanization. The null hypothesis, according to which "Size of landholding and impact do not significantly correlate, was thus rejected.

This implies that the size of land owned did strongly influence the impact of farmers as they availed mechanization subsidy. Both small and large landholders appeared to benefit similarly from the subsidized equipment imparted through scheme.

8. Cropping pattern with impact

The data shown in Table 4.21 revealed that, the farmers' degree of impact about farm machinery scheme and cropping pattern had a positive and significant connection (r = 0.179*) The null hypothesis, according to which "cropping pattern and impact of farm mechanization subsidy do not significantly correlate," therefore rejected.

We may conclude that impact of subsidy positively and significantly correlated with cropping pattern. The findings indicate that, more diverse planting pattern aided by farmers after availing subsidy.

9. Source of irrigation with impact

The findings in Table no.1 indicated that, there was a positive but non significant connection (r = 0.021NS) between source of irrigation and impact. The null hypothesis, "There is no significant relationship between source of irrigation and impact of mechanization" accepted.

Source of irrigation has a favourable but not directly significant relationship with impact. as which source farmer use for irrigation is not related with impact

10. Mass media utilization with impact

The findings in Table no.1 illustrated that, there was a positive and highly significant a relationship (r = 0.191*) between mass media utilization and impact of scheme. The null hypothesis, "There is no significant relationship between mass media utilization and Impact of farm mechanization" rejected.

It can be stated that utilisation of media has a favourable and significant relationship with impact. This demonstrates that increased use of the media assisted farmers in gathering more information.

11. Risk preference with impact

The findings in Table no.1 stated that, there was a positive and highly significant relationship (r = 0.212**) between risk preference and impact about mechanization subsidy. The null hypothesis, which stated that, "There is no significant association between risk preference and impact of availed subsidy" rejected.

It stated that risk preference was positively and highly significant associated with impact. This suggests that farmers who were actively taking risk for new technologies implementation had greater impact of mechanization.

12. Economic motivation with impact

Table 1. Coefficient of correlation between selected characteristics of respondent farmers with their impact:

Sr. No	Independent Variables	Correlation Coefficients (r)
1	Age	0.167*
2	Education	0.178*
3	Type of family	0.029_{NS}
4	Occupation	0.182*
5	Social participation	0.196*
6	Annual income	0.188*
7	Size of landholding	0.186*
8	Cropping pattern	0.179*
9	Sources of irrigation	0.021_{NS}
10	Mass Media utilization	0.191*
11	Risk preference	0.212**
12	Economic motivation	0.225**

**Significant of 0.01 level of probability,*Significant of 0.05 level of probability, NS- Non Significant

Table no.1 highlighted that, a highly significant positive correlation (r = 0.225**) between economic motivation and the impact of farm subsidy.

This indicates that respondent farmers who are driven by economic improvement and financial gains are more interested and attentive during subsidy programmes. Their desire to increase income encourages them to learn new skills and knowledge which they can apply to avail mechanization to improve productivity or start income-generating activities.

Therefore, economic motivation acts as a stimulus for applying for subsidy and the null hypothesis is rejected.

2. Constraints faced by respondent farmers after availing farm mechanization subsidy

It observed from Table No. 2 that, Delay in approval and sanction of subsidy (63.33%) was the major constraint faced by the respondent farmers and it rank first. This followed by Delay in subsidy disbursement (52.66%), which was rank second.

The third major constraint was the Requirement of high initial investment before receiving subsidy. (47.33%), followed by Selection of beneficiaries through computerized lucky draw creates uncertainty in receiving the required machinery (44.66%) and GST paid on farm machinery is not considered while calculating the subsidy amount (42.00%), rank fourth and fifth, respectively.

Further, Lack of awareness about scheme guidelines eligibility (40.66%) was rank sixth. Technical problems while applying through Maha DBT portal like internet connectivity, server down (38.66%) also reported as a constraint and rank seventh.

Other constraints included High maintenance and repair cost of machinery (32.00%), Difficulty in recovering investment despite subsidy (26.00%) were ranked eighth and ninth respectively

Table 2. Constraints faced by respondent farmers after availing farm mechanization subsidy

Sr.No.	Constraints	Frequency	Percentage	Rank
1.	Delay in approval and sanction of subsidy	95	63.33	I
2.	Delay in subsidy disbursement.	79	52.66	II
3.	Requirement of high initial investment before receiving subsidy	71	47.33	III
4.	Selection of beneficiaries through computerized lucky draw creates uncertainty in receiving the required machinery	67	44.66	IV
5.	GST paid on farm machinery is not considered while calculating the subsidy amount	63	42.00	V

(continued on next page)

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Sr.No.	Constraints	Frequency	Percentage	Rank
6.	Lack of awareness about scheme guidelines eligibility	61	40.66	VI
7.	Technical problems while applying through Maha DBT portal like internet connectivity, server down	58	38.66	VII
8.	High maintenance and repair cost of machinery	48	32.00	VIII
9.	Difficulty in recovering investment despite subsidy	39	26.00	IX

3. Suggestions provided by the respondent farmer to overcome the problems after availing the farm mechanization subsidy

Table 3. Suggestions provided by the respondent farmer to overcome the problems after availing the farm mechanization subsidy

Sr.No.	Suggestions	Frequency	Percentage	Rank
1.	Ensure timely approval and release of subsidy amount	121	80.66	I
2.	Simplify the documentation and application procedure	103	68.66	II
3.	Increase subsidy amount or provide higher assistance to small and marginal farmers	97	64.66	III
4.	About the Maha DBT portal- improve to provide training to fill online application	93	62.00	IV
5.	The subsidy should also cover the GST component of farm machinery to reduce financial burden on farmers	85	56.66	V
6.	Strengthen awareness programmes and extension activities regarding subsidy schemes	82	54.66	VI
7.	About the Maha DBT portal- improve to provide technical assistance during online application	76	50.66	VII
8.	Strengthen co ordination between agriculture department, banks, and machinery dealers	68	45.33	VIII
9.	Provide custom hiring centers (CHCs) to improve machinery access and utilization	60	40.00	IX

From the Table No.3 it seen that, the large majority (80.66%) of respondent farmers suggested to, Ensure timely approval and release of subsidy amount, this suggestion rank first.

This followed by the suggestion that Simplify the documentation and application procedure (68.66%), which was rank second. Increase subsidy amount or provide higher assistance to small and marginal farmers (64.66%) were, also recommended by the respondents and rank third.

Further, About the Maha DBT portal- improve to provide training to fill online application (62.00%), rank fourth, followed by the suggestion that The subsidy should also cover the GST component of farm machinery to reduce financial burden on farmers (56.66%), which was rank fifth.

Strengthen awareness programmes and extension activities regarding subsidy schemes (54.66%), rank sixth. About the Maha DBT portal-improve to provide technical assistance during online application (50.66%), which rank seventh And Strengthen co ordination between agriculture department, banks, and machinery dealers (45.33 %) which was rank eighth. Lastly Provide custom hiring centers (CHCs) to improve machinery access and utilization (40.00%) rank ninth.

These suggestions reflect that improving administrative efficiency, financial accessibility, technical support, and post-purchase services can strengthen the implementation and effectiveness of farm mechanization subsidy programmes.

Conclusion

The study observed that independent variables such as age, education, occupation, annual income, size of landholding, cropping pattern, social participation, mass media utilization, risk preference and economic motivation had a positive and significant correlation with impact of farm mechanization. Among these, risk preference and economic motivation showed a highly significant relationship with impact while type of family and source of irrigation were positive but non significantly correlated with impact.

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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