RESEARCH PAPER

Studies on problems associated with farm mechanization in Kangra district of Himachal Pradesh

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Abstract : Farm mechanization has been recognized as one of the important inputs for increasing the productivity of land by ensuring timeliness and precision of agricultural operations, reduction of loss of crops and food products, increased labour work output per unit time by reducing efforts and drudgery and improved quality of farm operations. Therefore, present study on problems of farm mechanization was conducted in Kangra district of Himachal Pradesh. Primary data was compiled from 80 farmers/households (56 small and 24 large) selected randomly from 8 villages of Nurpur and Panchrukhi block in Kangra district. The major problems associated with farm mechanization reported by farmers were undulating and high slope, scattered holdings, small size of fragments, terraced and non-uniform shape of fields, poor financial conditions of the respondents for buying machineries, lack of proper trainings about operation of implements/machineries. Based on the findings of the study, it was suggested that the state government should increase the existing level of subsidy from 25 per cent to 50 per cent on farm machinery and implements especially in case of tractors and power tillers and connectivity of operational holdings with the roads for the overall development of agriculture in hilly areas. The topography in study area is mostly hilly and undulating and was identified as one of the major constraints with respect to farm mechanization. Therefore, emphasis should be given in the designing and manufacturing of small size tractors suitable for the hilly regions of the state.

Key Words : Farm, Mechanization, Problems, Power, Strategy

INTRODUCTION

Agricultural mechanization technology is considered as an essential input to agriculture which plays a vital role in developing counties for improving agricultural production (Rasouli *et al.,* 2009). The use of traditional implements was more popular than the improved implement and machinery and the majority of farmers were small and could rarely afford to purchase huge and costly agricultural implements and machinery (Ray, 1993). Farm mechanization by means of both draught animals and tractors was identified as a necessary component against the complex measures in order to achieve a dynamic development of farms and was suggested that technological, ecological and social

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aspects must be taken into account for addressing the problems of farm mechanization and increasing agricultural production in the developing countries (Pfeiffer, 1991). Proper use of mechanized inputs into agriculture has a direct and significant effect on production, productivity and profitability on agriculture farms, along with labour productivity and quality of life of people engaged in agriculture (Bishop, 1997 and Clarke, 2000).

Agricultural mechanization is the use of modern implements as well as motorized equipment likeplough, harrow, ridgerspray pumps etc., on the farm. Though, mechanization of farming operation has obvious advantages but it requires heavy initial investments on machinery and associated implements. Lack of credit facilities and finance also observed as important constraints in adoption of precision farming (Maheswari, 2008). At the same time there are other problems associated with the use of machinery in farming like maintenance of the machines, availability of spare parts, socio economic factors, etc. As such, during the survey, farmers were enquired about the various problems associated with the use of machineries in different crop production operations, which hinders the adoption of farm mechanization at desired level. It is true that farm mechanization has shown good results with respect to raising the agricultural production, reducing drudgery and with respect to time management, etc., in different parts of country.

As far as development of agriculture is concerned, Himachal Pradesh is one of the model hilly States of the country. The State favours successful cultivation of the wide range of agricultural and horticultural crops enterprises because the state is well-endowed with varied type of agro-climatic conditions but, the level of farm mechanization is poor with respect to mechanized power and efficient tools and implements used by the farmers. Some of the main reasons for low level of mechanization in the hilly region of the State are the undulating topography, small and irregular sized fields, lack of skilled manpower, poor facilities of repair and maintenance, poor purchasing power of farmers and non-availability of improved farm implements and machines. All of the above constraints, the farmers are mechanizing a few farm production operations especially in case of land preparation, sowing, harvesting, threshing, etc., since agriculture labour is becoming scarce and costly due to government employment guarantee programmers.

Keeping above factors into consideration, the present endeavour was planned in Kangra district of Himachal Pradesh to highlight the problems associated with farm mechanization.

MATERIAL AND METHODS

Himachal Pradesh is a small state, but it has wide variations with respect to topography, elevations, an agro-climatic condition, socio-economic and other cultural factors etc., which directly or indirectly affects the extent of farm mechanization. The lower parts of the state are relatively plain and suitable for farm mechanization while the mid and high hill areas has limited scope of farm mechanization. Thus, it was desired that a region or a district of state be selected which may represent the average situation of the state. Since, time and resources were the major constraints and it was decided that the present study will be confined to only one district of the state, having good number of holdings, crop diversity, irrigated and rain fed farming situations, farming on plain and hilly tracks etc. Therefore, for the present study district Kangra of Himachal Pradesh was selected purposively as it has highest percentage of cultivated land and represents 3 agro-climatic zones and has plain hilly area. For the selection of the respondents, multi-stage random sampling design was used. At the first stage, a sample of two blocks namely Panchrukhi and Nurpur were selected randomly. At the second stage, sample of 8 villages was drawn randomly through equal proportion method i.e. 4 villages from Panchrukhi and Nurpur block each. At the third stage, sample of 80 farmers was drawn randomly representing 10 farmers from each selected village. The selected farmers were categorized into two categories i.e. small farmers ($\leq$ 2ha) and large farmers (>2ha). The primary data were collected from the selected farming households. The data were collected through the personal survey method on specifically designed survey schedule. The detailed information on problems and constraints associated with farm mechanization in the study area was collected on well-designed pre-tested schedule and ranks were assigned to each problem by using the total weighted score method.

Total weighted score:

In order to rank the problems associated with mechanization reported by the respondents, total

weighted score was used which was estimated with following formula:

$$\text{Total weighted score (TWS)} = \sum_{i=1}^{n} F_i X_i$$

where,

F_i= Number of respondents giving response to the attribute

X_i= Weight assigned to particular attribute.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Problems associated with farm mechanization:

The problems faced by selected sample farmers with respect to farm mechanization were identified and grouped in three groups *i.e.* associated to topography and land holding, purchase/hire decisions and level of awareness about using technology in accomplishing the various crop production operations of crop production. The response of selected farmers to these problems was drawn and compiled as under:

Problems associated with topography and land holding:

The major issues in this regard concerning to the

Table 1: Extent of problems associated with mechanization with respect to topography and land holdings on sample farms (Number)

Sr. No.	Particulars	Small	Large	Overall
1.	Undulating	42 (75.00)	11 (45.83)	53 (66.25)
2.	High slope	2 (3.57)	1 (4.17)	3 (3.75)
3.	Scattered holdings	40 (71.43)	9 (37.50)	49 (61.25)
4.	Non-availability of proper roads to fields	32 (57.14)	14 (58.33)	46 (57.50)
5.	Small and terraced fields	26 (46.43)	9 (37.50)	35 (43.75)
6.	Fields not uniform in shape	43 (76.79)	12 (50.00)	55 (68.75)
7.	Small size of fragments	17 (30.36)	8 (33.33)	25 (31.25)
8.	Others, if any	4 (7.14)	6 (25.00)	10 (12.50)

Note: Figures in parentheses indicate percentages to total in each category

Table 2: Classification of problems associated with topography with respect to severity of problem   (Number of respondents)

Sr. No.	Particulars	Small			Large			Overall			Total weighted score		
		L	M	H	L	M	H	L	M	H	Small	Large	Overall
1.	Undulating	21	13	8	6	5	-	27	18	8	71	16	87
	(%)	37.50	23.21	14.29	25.00	20.83	-	33.75	22.50	10.00	I	II	I
2.	High slope	1	1	-	1	-	-	2	1	-	3	1	4
	(%)	1.79	1.79	-	4.17	-	-	2.50	1.25	-	VIII	VIII	VIII
3.	Scattered holdings	20	15	5	6	3	-	26	18	5	65	12	77
	(%)	35.71	26.79	8.93	25.00	12.50	-	32.50	22.50	6.25	III	VI	III
4.	Non-availability of proper roads to fields	17	12	3	9	5	-	26	17	3	50	19	69
	(%)	30.36	21.43	5.36	37.50	20.83	-	32.50	21.25	3.75	VI	I	IV
5.	Small and terraced fields	16	8	2	4	5	-	24	10	6	38	14	62
	(%)	28.57	14.29	3.57	16.67	20.83	-	30.00	12.50	7.50	V	VI	V
6.	Fields not uniform in shape	24	12	7	8	4	-	32	16	7	69	16	85
	(%)	42.86	21.43	12.50	33.33	16.67	-	40.00	20.00	8.75	II	II	II
7.	Small size of fragments	12	3	2	5	2	1	17	5	3	24	12	36
	(%)	21.43	5.36	3.57	20.83	8.33	4.17	21.25	6.25	3.75	VI	VI	VI
8.	Others, if any	4	-	-	5	1	-	9	1	-	4	7	11
	(%)	7.14	-	-	20.83	4.17	-	11.25	1.25	-	VII	VII	VII

sample households have been compiled in Table 1 and Table 2. It can be seen from the Table 1 that undulating and high slope were the major problems associated with topography. The problem of undulating topography was reported to be the major problem by 75, 46 and 66 per cent on small, large and overall categories of farms, respectively. The high slope was not a major concern for the majority of farmers as this problem was reported by only about 4 per cent of sample households. It was observed that although the topography of region was hilly but as far as possible, relatively plain areas were brought under cultivation of crops. High slopped and undulating areas were kept for fruit and fodder production by the majority of the households.

The major problems associated with land holdings with respect to agricultural mechanization were reported to be scattered holdings, small size of fragments, small and terraced fields and non-uniform shape of fields by the respondents. Among these problems, the majority of farmers (about 69 %) were of the view that shape of the field is the major issue for mechanization. The problem of small and terraced fields and non-availability of proper roads to the fields were reported by about 44 and 58 per cent of the sample farmers, respectively on overall farm situation. In general, the extent of these problems was found to higher on small farms as compared to large farm categories.

These problems were further ranked by using total weighted score method in (Table 2). The cursory glance of the table indicates that the problem of undulating topography, non-uniform shape of fields and scattered holdings were the major concerns as far as farm mechanization in the study area is concerned. The

changing of topography is not in the preview of planners but the farm mechanization in the area may be improved through the consolidation of holdings. The table further indicates that the problems like; high slope of topography, small size of fragments have least effect on farm mechanization. By and large the extent of problems experienced by small and large categories of farm was same.

Purchase decision and hiring of farm machinery:

The issues related to purchasing and hiring of farm machinery has been analysed and responses to various problems are presented in Table 3 and 4. It can be seen from the Table 3 that as far as purchasing of machinery and implements was concerned, high cost of machinery and implements was indicated as the major problem by 80 per cent respondents. The poor financial position of the respondents was the next foremost problem concerning to purchase decisions. Although, the government is promoting financing the farmers on easy terms through banks, yet the problem like; high interest rate, time consuming sanctioning of loans, etc., was reported by 20-30 per cent of respondents in different categories of farms. The proportion of respondents indicating these problems was comparatively higher on small farms as compared to large farm categories.

During the survey, it was reported by the majority of farmers that they are using the services of tractor/power tiller and thresher, etc., on hiring basis rather than purchasing the implements/machinery for personal use on the farms. It was mainly due to the fact that it was un-economical to purchase these items as they don't have farm work round the year for the full utilization of their

Table 3: Extent of problems associated with mechanization with respect to purchase decision and hiring of farm machinery on sample farms

(Number)

Sr. No.	Particulars	Small	Large	Overall
1.	Selection of machinery/implements	20 (35.71)	6 (25.00)	26 (32.50)
2.	Poor financial condition	25 (44.64)	9 (37.50)	34 (42.50)
3.	Costs are high	47 (83.93)	17 (70.83)	64 (80.00)
4.	Lack of adequate financing	17 (30.36)	4 (16.67)	21 (26.25)
5.	Interest rate on loans are high	15 (26.79)	5 (20.83)	20 (25.00)
6.	Sanctioning of loan is time consuming	8 (14.29)	2 (8.33)	10 (12.50)
7.	Hiring charges are costly	48 (85.71)	19 (79.17)	67 (83.75)
8.	Not available in time	23 (41.07)	11 (45.83)	34 (42.50)
9.	Not available in villages	3 (5.36)	1 (4.17)	4 (5.00)

Note: Figures in parentheses indicate the percentages of the total sample of each category

services. Majority of the farmers *i.e.* more than 80 per cent were of the view, that charges of tractor/power tiller and thresher, etc., charged by the supplier were quite high. About 41 and 45 per cent of small and large farms indicated that they are not getting the services of hired machinery and implements well in time. The table further indicates that the hiring of these implements was generally available in the villages itself, only 4-5 per cent of the farmers indicated that these implements are not available in their villages.

Table 4: Classification of problems associated with purchase decision and hiring of farm machinery with respect to severity of problem

(Number)

Sr. No.	Particulars	Small			Large			Overall			Total weighted score		
		L	M	H	L	M	H	L	M	H	Small	Large	Overall
1.	Selection of machinery/Implements	15	4	2	5	1	-	20	5	2	29	7	36
	(%)	26.79	7.14	3.57	20.83	4.17	-	25.00	6.25	2.50	IV	V	V
2.	Poor financial condition	18	6	1	6	3	-	24	9	1	33	12	45
	(%)	32.14	10.71	1.79	25.00	12.5	-	30.00	11.25	1.25	III	IV	III
3.	Costs are high	28	12	7	12	5	-	40	17	7	73	22	95
	(%)	50.00	21.43	12.50	50.00	20.83	-	50.00	21.25	8.75	I	II	II
4.	Lack of adequate financing	13	3	1	4	-	-	17	3	1	22	4	26
	(%)	23.21	5.36	1.79	16.67	-	-	21.25	3.75	1.25	VI	VII	VII
5.	Interest rate on loans are high	10	5	-	4	1	-	14	6	-	20	6	26
	(%)	17.86	8.93	-	16.67	4.17	-	17.5	7.50	-	VII	VI	VI
6.	Sanctioning of loan is time consuming	5	3	-	2	-	-	7	3	-	11	2	13
	(%)	8.93	5.36	-	8.33	-	-	8.75	3.75	-	VIII	VIII	VIII
7.	Hiring charges are costly	30	13	5	12	6	1	42	19	6	71	27	98
	(%)	53.57	23.21	8.93	50.00	25.00	4.17	52.5	23.75	7.50	II	I	I
8.	Not available in time	18	5	-	7	4	-	25	9	-	28	15	43
	(%)	32.14	8.93	-	29.17	16.67	-	31.25	11.25	-	V	III	VI
9.	Not available in villages	3	-	-	1	-	-	4	-	-	3	1	4
	(%)	5.36	-	-	4.17	-	-	5.00	-	-	IX	IX	IX

Table 5: Extent of problems associated with mechanization with respect to technology and awareness on sample farms (Number)

Sr. No.	Particulars	Small	Large	Overall
	Awareness			
1.	Lack of full awareness about farm machinery and implements	32 (57.14)	14 (58.33)	46 (57.50)
2.	Lack of adequate training for operationalization of farm machinery and equipments	53 (94.64)	22 (91.67)	75 (93.75)
3.	Lack of agricultural Engineer in line department	50 (89.29)	20 (83.33)	70 (87.50)
4.	Lack of knowledge about proper management	35 (62.50)	14 (58.33)	49 (61.25)
5.	poor knowledge about govt. schemes	4 (7.14)	3 (12.50)	7 (8.75)
	Technology			
1.	Expensive repair and service facilities	22 (39.29)	7 (29.17)	29 (36.25)
2.	Technology is not need based	13 (23.21)	6 (25.00)	19 (23.75)
3.	Small machinery is not easily available	3 (5.36)	2 (8.33)	5 (6.25)
4.	Maintenance costs are high	43 (76.79)	15 (62.50)	58 (72.50)
5.	Spare parts are not easily available	24 (42.86)	14 (58.33)	38 (47.50
6.	Cost of spare part is high	7 (12.50)	4 (16.67)	11 (13.75)
7.	Repair shops are very limited or situated at faraway places	8 (14.29)	5 (20.83)	13 (16.25)

Note: Figures in parentheses indicate percentages to total in each category

The severity of these problems to the sample respondents was analyzed by using the total weighted score (Table 4). The analysis revealed that hiring charges are costly, cost are high and poor financial conditions were having high bearing as far as purchasing and hiring of farm machinery and implements is concerned. On the other hand, the problems like; non-availability of machinery and implements in time and late sanctioning of loans by banks has least concerned with purchasing and hiring of implements for farm mechanization.

Technology and awareness:

The issues related to technology and awareness of the respondents with respect to technology were analysed

Sr. No.	Particulars	Small			Large			Overall			Total weighted score		
		L	M	H	L	M	H	L	M	H	Small	Large	Overall
	Awareness												
1.	Lack of full awareness about farm machinery and implements	18	12	2	7	6	1	25	18	3	48	22	70
	(%)	32.14	21.43	3.57	29.17	25.00	4.17	31.25	22.50	3.75	III	III	III
2.	Lack of adequate training for operationalization of farm machinery and equipments	29	12	12	15	5	2	44	17	14	89	31	120
	(%)	51.79	21.43	21.43	62.50	20.83	8.33	55.00	21.25	17.50	I	I	I
3.	Lack of agricultural Engineer in lined department	21	23	6	16	2	2	37	25	8	85	26	111
	(%)	37.50	41.07	10.71	66.67	8.33	8.33	46.25	31.25	10.00	II	II	II
4.	Lack of knowledge about proper management	24	9	2	9	4	1	33	13	3	48	20	68
	(%)	42.86	16.07	3.57	37.5	16.67	4.17	41.25	16.25	3.75	III	VI	VI
5.	Poor knowledge about govt. schemes	4	-	-	3	-	-	7	-	-	4	3	7
	(%)	7.14	-	-	12.50	-	-	8.75	-	-	V	V	V
	Technology												
1.	Expensive repair and service facilities	14	8	-	7	-	-	21	8	-	30	7	37
	(%)	25.00	14.29	-	29.17	-	-	26.25	10.00	-	III	VI	III
2.	Technology is not need based	10	3	-	4	2	-	14	5	-	16	8	24
	(%)	17.86	5.36	-	16.67	8.33	-	17.50	6.25	-	VI	III	VI
3.	Small machinery is not easily available	3	0	-	2	-	-	5	-	-	3	2	5
	(%)	5.36	0	-	8.33	-	-	6.25	-	-	VII	VII	VII
4.	Maintenance costs are high	23	10	10	11	2	2	34	12	12	73	21	94
	(%)	41.07	17.86	17.86	45.83	8.33	8.33	42.50	15.00	15.00	I	I	I
5.	Spare parts are not easily available	16	5	3	10	3	1	26	8	4	35	19	54
	(%)	28.57	8.93	5.36	41.67	12.50	4.17	32.50	10.00	5.00	II	II	II
6.	Cost of spare part is high	6	1	-	4	-	-	10	1	-	8	4	12
	(%)	10.71	1.79	-	16.67	-	-	12.5	1.25	-	VI	VI	VI
7.	Repair shops are very limited or situated at far away places	4	2	2	3	2	-	7	4	2	14	7	21
	(%)	7.14	3.57	3.57	12.5	8.33	-	8.75	5.00	2.50	V	VI	V

Table 6: Classification of problems associated with technology and awareness with respect to severity of problem (Number of respondents)

and depicted in Table 5 and 6. It can be observed from the Table 5 that the issues like; high maintenance cost, small machinery is not easily available, expensive repair and service facilities, etc., were the major problems faced by the respondents as far as adoption of farm mechanization technology was concerned. Among these, the problem of high cost of maintenance was the key issue reported by majority of the respondents (73%). Therefore, in order to promote the farm mechanization, government should promote entrepreneurship in potential areas for the repair of implements, so that maintenance of implement become easy and cheap. The problem of need based technology, expensive repair service facilities, non-availability of spare parts, etc., was also reported by 23-48 per cent sample respondents. The ranking of problems based on their severity indicates that maintenance cost of implements and non-availability of spare parts were the major problem responsible for slow pace of farm mechanization in the study area.

It was reported by the majority of respondents that they have very little knowledge about the technical and operational issues about farm machinery and implements. The response towards the issues related to their awareness level has been analyzed (Table 6). It can be seen from the table that lack of proper trainings about operation of implements, lack of agricultural engineer, lack of proper knowledge about maintenance, etc., were reported as the major problems associated with the awareness level of the respondents. The response of respondents to these problems varied between 61 to 94 per cent. The majority of the farmers were of the view that the line departments encourage them for the purchase of farm machinery and implements but there is lack of technical experts with these departments. This is also one of the reasons that their knowledge about the technology is poor. Therefore, it is suggested that there should be provision of at least one expert (Agricultural engineer) at block level. It will be helpful in guiding the farmers about the proper maintenance, thus, farm mechanization will be automatically promoted. As far as severity of these problems regarding the awareness among respondents was concerned, rank one given to lack of adequate training followed by lack of agricultural

engineer (rank two). Among technology of farm mechanization issues, problems of high maintenance cost was reported to be at top followed by spare parts are not easily available.

Conclusion:

Based on the present study, it was concluded that the major problems associated with farm mechanization reported by farmers were undulating and high slope, scattered holdings, small size of fragments, terraced and non-uniform shape of fields, poor financial conditions of the respondents for buying machineries, lack of proper trainings about operation of implements/machineries. Based on the findings of the study, it was suggested that the state government should increase the existing level of subsidy from 25 per cent to 50 per cent on farm machinery and implements especially in case of tractors and power tillers and connectivity of operational holdings with the roads for the overall development of agriculture in hilly areas. The topography in study area was mostly hilly and undulating and was identified as one of the major constraints with respect to farm mechanization.

REFERENCES

Bishop, C. (1997). *A guide to preparing an agricultural mechanization strategy*, AGSE.FAO, Rome, Italy.

Clarke, L.J. (2000). *Strategies for agricultural mechanization development: The roles of the private sector and the Government.* Agricultural Support Systems Division, FAO Publication, Rome, Italy.

Maheswari, R. (2008). Precision farming technology, adoption decisions and productivity of vegetables in resource-poor environments. *Agric. Econ. Res. Rev.*, **21**: 415-424.

Pfeiffer, A. (1991). Economic problems of farm mechanization in developing countries. *Beiträge zur tropischen Landwirtschaft und Veterinärmedizin,* **29**: 131-136.

Rasouli, F., Sadighi, H. and Minaei, S. (2009). Factors affecting agricultural mechanization: A case study on sunflower seed farms in Iran. *J. Agric. Sci. & Technol.*, **11**: 39-48.

Ray, A.K. (1993). The present status of agricultural mechanization and its constraints. *Agricultural-Situation-in-India,* **48**: 245-250.

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