2014

Aarhat Multidisciplinary International Education Research Journal (AMIERJ)

(Bi-Monthly)
Peer-Reviewed Journal
Impact factor: 0.948

VOL - III Issues: V

Chief-Editor:

Ubale Amol Baban

30/11/2014

Aarhat Multidisciplinary International Education Research Journal (AMIERJ)

(Bi-Monthly) Peer-Reviewed Journal Vol No III Issues V
Oct-Nov 2014 ISSN 2278-5655

IMPACT OF MECHANIZATION ON CROPS PRODUCTIVITY IN AKOLA DISTRICT

D.N. Ingole [1]

[1] Field Manager

KVK, Risod,

Abstract

The study has examined the impact of mechanization on productivity. Mechanization in Indian agriculture started with the establishment of the Central Tractor Organization (CTO) mainly for land reclamation and development, mechanical cultivation. The production of irrigation pumps and diesel engines started during 1930s. The manufacture of tractors and power tillers started in 1960. Since then by the virtue of its inherent edge over the conventional means of farming, agricultural mechanization has been gaining popularity. The present study was conducted in Akola district of Vidarbha region for the period 2012-2013. From Akola district 5 tahsil were selected randomly i.e. Patur, Balapur, Akola, Akot and Murtizapur. For this study 6 villages were selected from each tahsil of Akola district, i.e total 30 villages selected. The mechanization development level changed in all selected villages over the study period i.e. on an average the composite index of mechanization in 1990 was 0.6757 and in 2013 it was 0.4430. The total contribution explained by mechanization was 10.70 percent in explaining crops productivity. It indicated that the indicators of mechanization contributed 10.70 per cent the productivity of crops.

Key words: *Agricultural mechanization, crop productivity, composite index*

Farm mechanization has been helpful to bring about a significant improvement in agricultural productivity. Thus, there is strong need for mechanization of agricultural operations. The factors that justify the strengthening of farm mechanization in the country can be numerous. The timeliness of operations has assumed greater significant in obtaining optimal yields from different crops, which has been possible by way of mechanization. The quality and precision of the operations are equally significant for realizing higher yields. The various operations such as land leveling, irrigation, sowing and planting, use of fertilizers, plant protection, harvesting and threshing need a high degree of precision to increase the efficiency of the inputs and reduce the losses. Agricultural mechanization has made significant contribution in enhancing cropping intensity Shambhu and Ram (2007) The growth in irrigated areas and tractor density has had direct bearing on the cropping intensity. Farm mechanization led to increase in inputs on account of higher average cropping intensity and larger area and increased productivity of farm labour. The farm mechanization increased agricultural production and profitability on account of timeliness of operation, better quality of work done and more efficient utilization of inputs. The farm mechanization increases on- farm human labour marginally, whereas the increase in off-farm labour such as industrial production of tractors and ancillaries was much more.

In the present study, an attempt has been made to examine the impact of mechanization on crops productivity with the objectives to study the present status of mechanization in agriculture. To study the productivity of crops grown in selected villages and to assess the impact of mechanization on productivity.

Methodology

Selection of area

The present study was undertaken in Akola district of Vidarbha region for the period 2012-2013. From Akola district 5 tahsil were selected randomly i.e. Patur, Balapur, Akola, Akot and Murtizapur.

3.2 Selection of villages

For this study 6 villages were selected from each tahsil of Akola district, i.e total 30 villages selected.

3.3 Collection of data

The data was collected from primary and secondary sources. The data pertain to the year from 1990 to 2013. The following indicators were selected for collecting data.

Variables of agricultural (farm) mechanization

1. No. of wooden plough / 100 ha. of net cultivated area.
2. No. of steel plough / 100 ha. of net cultivated area.
3. No. of disc harrow / 100 ha. of net cultivated area.
4. No. of cultivators / 100 ha. of net cultivated area.
5. No. of puddlers / 100 ha. of net cultivated area.
6. No. of sowing device / 100 ha. of net cultivated area.
7. No. of leveling kerecha / 100 ha. of net cultivated area
8. No. of threshers / 100 ha. of net cultivated area.
9. No. of crushers / 100 ha. of net cultivated area.
10. No. of persian wheel / 100 ha. of net cultivated area.
11. No. of bullock carts / 100 ha. of net cultivated area.
12. No. of spray dusters / 100 ha. of net cultivated area.
13. No. of tractors / 100 ha. of net cultivated area.
14. No. of electrical and diesel pumps / 100 ha. of net cultivated area.

3.3.3 Crops selected

For the study following crops were selected.

1. Soybean
2. Cotton
3. Gram
4. Kharif Jowar
5. Tur

3.4 Analytical tools

3.4.1 Simple tabular analysis

Simple tabular analysis was carried out to study the present status of agricultural mechanization and productivity of crops grown in selected villages.

3.4.2 Impact of agricultural mechanization and agricultural development

To measure the degree of development of different villages, the composite Index of agricultural development and agricultural mechanization were computed by using methodology suggested by Narian (2007).

$$Z_{ij} = \frac{|x_{ij} - \bar{x}_j|}{S.D.}$$

Where,

Z_{ij} - Matrix of standardized indicators

S.D. - Standard deviation

x_{ij} - Value of j^{th} indicator of i^{th} village

$\bar{x}_j$ - Mean of j^{th} indicator

Let the best value for the j^{th} indicator be Z_{oj}.

For obtaining the pattern of development, calculate P_{ij} as follows.

$P_{ij} = (Z_{ij} - Z_{oj})^2$

Pattern of development is further standardized and a new parameter C_i and is given as

$$Ci = \left[\sum_{j=1}^{k} (Zij - Zoj)2\right]^{1/2}$$

Composite development index D_i is given by

$D_i = C_i / C$ for i = 1, 2, . . . n

Where,

$$\bar{C} = \bar{C} + 3SD_i$$

$\bar{C}$ = Mean of C_i

SD_i = Standard deviation of C_i

The value of composite index lies between 0 and 1, smaller value of D_i will indicate high level of development and higher value of D_i will indicate low level of development.

Results and Discussion

Present status of mechanization in agriculture

Among all crops grown in Akola district, Soybean, Cotton, Tur, Gram crops plays an important role. The implements used for the cultivation of these crops for performing various agricultural operations plays an important role in production. The implements used for the cultivation of these crops are presented in table 1.

Table 1 Percent change in implements on the base of 1990

Sr. No.	Implement	1990	2010	Percent change on the base of 1990	2013	Percent change on the base of 1990
1	Wooden plough	398	534	34.17	559	40.45
2	Steel plough	556	1105	98.74	1124	102.15
3	Disc harrow	26	86	230.77	96	269.23
4	Cultivators	407	660	62.16	733	80.09
5	Puddlers	31	72	132.26	78	151.61
6	Sowing device	471	832	76.65	908	92.78
7	Leveling karecha	32	85	165.63	106	231.25

8	Threshers	27	88	225.93	128	374.07
9	Crushers	25	61	144.00	73	192.00
10	Persian wheel	32	63	96.88	70	118.75
11	Bullock cart	359	544	51.53	559	55.71
12	Spray dusters	70	131	87.14	147	110.00
13.	Electric and diesel pumps	82	322	292.68	406	395.12
14	Tractors	32	102	218.75	117	265.62

It is revealed from table 5.1 that the availability of farm implements in all villages increased over the study period. The change in the availability of farm implements in 2010 ranges between 34.17 to 292.68 per cent. In 2010 change in the numbers of all implements as compared to implements in 1990. In 2010 number of electric pumps, disc harrow, threshers, tractors, levelling karecha these implements increased at 292.68 per cent, 230.77 per cent, 225.93 per cent, 218.75 per cent and 165.63 per cent and follow the other implements. Numbers of electric pumps increased due to increase in irrigated area in the selected villages. Numbers of tractors, disc harrow increased due to the area cultivated by these implement increased. Also change in the availability of farm implements in 2013 in all villages it ranges between 40.45 to 395.12 per cent. In 2013 the numbers of electric pumps, threshers, disc harrow and tractors increased at 395.12 per cent, 374.07 per cent, 269.23 per cent and 265.62 per cent and followed the other implements. That means the uses of the implements for the cultivation of crops are increased because it might be due to the cultivated area increased. In 2010 and 2013 the wider variability was recorded due to increase in number of electric pump, thresher, disc harrow and tractors over the study period. Shahare (2013)

The numbers of electric pumps are increased due to the increase in the area under irrigation in the selected villages.

5.2 Productivity of crops grown in selected villages

Productivity is the most important criteria in measuring the growth of any crop output. The success or failure of any improvement in the part of agriculture is measured by the resultant

increase or decrease in the productivity. The productivity performance of important crops are worked out and presented in the following table 2

Table 2 Percent change in average productivity of crops on the base of 1990

Sr. No	Crop	1990	2010	Percent change on the base of 1990	2013	Percent change on the base of 1990
1	Soybean	1336.96	1882.96	40.83	1912.23	43.02
2	Cotton	601.43	625.83	4.05	647.36	7.63
3	Gram	622.56	862.46	38.53	930.46	49.45
4	Kharif jowar	1610.23	1660.13	3.09	1703.03	5.76
5	Tur	615.13	1440.23	134.13	1532.1	149.06

The above Table 2 shows the percentage change in average productivity of crops in selected villages on the base of 1990. In 1990 the average productivity of Soybean, Cotton, Gram, Kharif jowar and Tur was 1336.96 kg/ha, 601.43 kg/ha, 622.56 kg/ha, 1610.23 kg/ha and 615.13 kg/ha. And in 2010 it was 1882.96 kg/ha, 625.83 kg/ha, 862.46 kg/ha, 1660.13 kg/ha and 1440.23 kg/ha respectively. That means the productivity of crops increased at 40.83 per cent, 4.05 per cent, 38.53 per cent, 3.09 per cent and 134.13 per cent. In 2013 the average productivity of Soybean, Cotton, Gram, Kharif jowar and Tur was 1912.23 kg/ha, 647.36 kg/ha, 930.46 kg/ha, 1703.03 kg/ha and 1532.10 kg/ha. The average productivity of Soybean, Cotton, Gram, Kharif jowar and Tur increased at 43.02 per cent, 7.63 per cent, 49.45 per cent, 5.76 per cent and 149.06 per cent. i.e. the productivity of crops grown in selected villages are increased. In 2010

and 2013 the wider variability recorded due to increase in the productivity of Tur.

3 Impact of mechanization on crops productivity

The mechanization is regarded as the application of technology in agricultural operation to do a job in better way to improve the productivity. The impact of mechanization on farm productivity which have highlighted below in the table 3.

Table 3 Impact of mechanization on crops productivity

Sr. No.	**Particulars**	**Coefficient**
1	Intercept	3.2073
2	Mechanization	0.4264**

5% level of significant = ** R^2 = 0.1070

The year wise average composite index of mechanization and average productivity of crops was taken. Regression analysis between the variables composite index of mechanization (x) and average productivity (y), adjusted for inputs was carried out.

The result indicated that the mechanization contributed significantly in crops productivity, as revealed by coefficient. The total contribution explained by mechanization was 10.70 percent in explaining crops productivity. It indicated that the indicators of mechanization contributed 10.70 per cent the productivity of crops.

Reference

Shambhu. V. B and R. B. Ram, 2007. Status of farm mechanization in Nalanda District of Bihar. AMA, *Agricultural Mechanization in Asia, Africa and Latin America.* 38(1):18-22.

Shahare. P.U, 2013. Agricultural Mechanization in Konkan region of Maharashtra. *Agricultural Engineering Today*. 36(2), pp: 6-9.

Narain P, S.D. Sharma, S.C. Rai and V.K. Bhatia, 2007. Statistical Evaluation of Socio-economic Development of Different States in India. *Jour. Indian Society Agricultural Statistics*. 6/(3), pp: 328-335.