CHAPTER 7

SUMMARY, CONCLUSIONS

AND SUGGESTIONS
The growth in agricultural production largely depends on innovations in technology. The new techniques of production make higher productivity possible and thus result in higher per Capita income for the people. In agriculture, there are several innovations viz irrigation, High-Yielding varieties of seeds, fertilizer consumption and use of pesticides. They all are necessary to increase productivity of land. In addition mechanization of agriculture is another important technological innovation for it.

Mechanization is often taken to mean tractor-cultivation. The advent of intensive cultivation and the introduction of HYV Seeds have increased the demand for tractors. A major feature of many of the new seeds (HYVs) is their shorter maturing period, which makes possible the cultivation of two or more crops in a year. With the introduction of the high investment, intensive agriculture and multiple cropping, it has become necessary to perform farm-operations timely and of satisfactory quality. The use of tractor in farm-operations saves time and makes possible completion of agricultural operations within time-limit which bullock-farming can not achieve.

Tractors were introduced to Indian agriculture in the early twenties. They are used mostly for ploughing, threshing and transporting. They can be used for seed-bed preparation, row-sowing, manuring, interculture and for providing power to the irrigation pump, the reaper, the thresher or the
There are two school of thought regarding the use of tractors in Indian agriculture. Some hold the view that tractors by promoting shifts in the production function help in raising the productivity, others are of the view that tractors displace human labour.

The basic objectives of the present study are (1) to find out the impact of tractorization on productivity (per acre) of paddy crop and (2) to analyse the impact of tractorization on human labour employment per acre.

In this study, we have formulated the following two hypotheses, (1) that tractorization in farming increases yield per acre of paddy in comparison to the bullock-operated farms and (2) that tractor displaces the human labour and therefore, the human labour employment per acre is less in the tractor-operated farms as compared to the bullock-operated farms.

The study is based on primary data and cross-section comparison is made between tractor-cultivated and bullock operated farms. The reference period for this study was one agricultural year 1986-87. Though the data were collected during the period January to March 1987. To find out the impact of tractorization on farm employment and productivity, 60 samples each from tractor and bullock-operated farm were selected in Raipur District. Multistage sampling is used to select the samples. In Raipur district, 1428 tractors were used during the year 1986-87. Out of them maximum of 380
tractors were found in Raipur Tahsil and out of them a maximum of 89 tractors were used in Dharsiwa Block. Therefore, we selected Dharsiwa block as a sample block in our study. In the block, we selected those villages where three or more than three tractors were used. Thus, 17 villages were selected for the study. In these villages, 60 tractor-owned farmers and an equal number of bullock-using farmers were selected using stratified random sampling technique.

Relevant data such as size of holdings, cropped area, cropping pattern, area irrigated, area under HYVs, fertilizer, consumption, production, yield (per acre) as well as human labour employment were collected through personal interview using pre-tested schedules. During the survey it was observed that all the sample farmers were using HYVs, Chemical fertilizers and pesticides. They had irrigation facilities also. Though the sample farms of the two types were not identical, they had close similarity regarding the size of holdings.

For analysis of data, first of all we classified all the sample farms into three categories viz., small size farms (below 10 acres), medium size farms (10-25 acres) and large size farms (25 acres and above). Percentage method is used to find out the cropping intensity, area irrigated and area under HYVs. Weighted arithmetic average is calculated to find out yield per acre as well as human labour employment per acre in tractor and bullock-operated farms.
Out of 120 samples, a large number of the sample farms (nearly 58 percent) fell in the medium size holdings in bullock-operated farms while they were 25 and 17 percent in the large and small size respectively. Of tractor-owned farms 45 percent samples each fell in the medium and large size holdings while it was only 10 percent in the small size. It showed that most of the sample farms fell in the medium and large size of holdings. The average size of the cultivated area is 35.3 acres in tractor-farms while it is 18.00 acres in bullock farms. It shows that the average size of the cultivated area is nearly double in tractor-farms. The percentage of area irrigated in tractor farms is 91 percent while it is 84 percent in bullock farms. Thus, the area irrigated in tractor-farms is higher by 7 percent.

In case of the Cropping intensity, it is 115.49 percent in tractor-operated farms than those of the 117.63 percent in bullock-operated farms. It is found marginally higher in bullock-operated farms. In case of cropping pattern it is important to note that Raipur is a mono-crop district. Paddy is the main produce of the region and therefore it is considered in the present study. In tractor-farms, nearly 87 percent of the gross cropped area fall in paddy cultivation while it is 13 percent only in wheat production. On the other side, in the bullock-operated farms, paddy and wheat both crops cover nearly 85 percent and 15 percent of the gross cropped area respectively. Thus, it does not show any significant variation in the cropping pattern in both types of farms.
The tractor-operated farms have higher area under HYVs as compared to the bullock-operated farms. In tractor-farms 74 percent area is under HYVs while it is 69 percent in bullock-farms. The consumption of fertilizers per acre (110.30 Kgs.) is higher in tractor-owned farms as compared to (85.78 Kgs.) the bullock-operated farms. It shows that the consumption of fertilizers per acre is too much higher in the tractor-owned farms.

The human labour employment per acre (75 mandays) is higher in the bullock-operated farms in comparison to (72 mandays) the tractor-owned farms. Thus, the human labour employment is higher by 3 percent in bullock-farms. In case of the family, permanent and casual labour employment separately we find that the family and casual labour employment are higher in bullock-operated farms while permanent labour is higher in tractor-operated farms.

In our hypothesis test, the value of $F$ is found significant at 1 percent level of significance. Hence, we accept our hypothesis that tractorization displaces the human labour employment.

In our regression analysis, (in case of human labour employment as a whole) we find that all the explanatory variables are insignificant except dummy variable (tractor). It proves that tractorization in farming displaces human labour employment. In case of tied and casual human labour separately, the regression analysis indicates that size of
holdings and dummy variable (tractor) both are significant while other explanatory variable viz., area irrigated, area under HYVs and fertilizer consumption are found insignificant. In brief, we can say that tractorization in agricultural operations displaces the human labour employment per acre.

The yield of paddy per acre is 14.86 quintals in the tractor-owned farms while it is 12.33 quintals in the bullock-operated farms. Thus, the yield per acre is marginally higher in tractor farms than those of the bullock-operated farms.

In our hypothesis test, value of $F$ is found significant at 1 percent level of significance. Thus, we accept our hypothesis that the tractor-operated farms, have higher productivity per acre as compared to the bullock-operated farms.

In the regression analysis, we find that the impact of tractor (dummy variable) is insignificant whereas, area irrigated, area under HYVs and fertilizer consumption are significant at 1 percent probability level. Hence, we can conclude that tractor itself does not affect the productivity in the district. The value of
$R^2(0.3591)$ shows the combined variations of all the explanatory variables included in the model. Remaining 64 percent variation is due to other factors which are not considered in this model. Thus, we conclude that though tractor farms have higher productivity of paddy per acre as compared to the bullock-farms but this higher productivity is not due to the use of tractor. Other factors such as, irrigated area, area under HYVs and fertilizer consumption etc. are responsible for higher productivity in tractor operated farms.

**SUGGESTIONS**

Despite the fact that 91 percent of the tractor operated area is irrigated, primarily from the canal, and optimum doses of fertilizer is used by the farmers, the productivity of paddy per acre is far below from the average production of Punjab and Haryana. We do not find much difference in the productivity of the land of tractor-operated farms and bullock-operated farms. The former is marginally higher than the latter. However, there is displacement of labour when tractor is used in place of bullocks though again by marginal man-days. Under these
circumstances one is put between the horns of a dilemma. The use of tractors need not be recommended in large scale because of lack of its contribution to production. But it could be accepted since its displacement effect is negligible.

The cost benefit ratio of tractor utilization does not seem to be favourable because, the impact of tractor on production appears to be insignificant. Perhaps the other uses of tractor viz, transportation might be a compensating factor to the cost and hence the farmers purchase the tractors. The only argument that can be given for the support of the use of tractors is that the cost of hiring labourers is increasing day by day. The farmers are directed to pay the minimum farm wages prescribed by the Government and the productivity of land is not such that they could pay the minimum wages stipulated by the Government. If the tractors are employed in place of labours perhaps, the overall cost to be incurred on tractor may be lesser than the cost involved in the payment of wages. But one has to remember the tremendous amount of social cost that would be involved due to displacement of labour. However, tractor could play a major role if the farmers could take multiple crops instead of one crop that is prevalent in the area. This is possible when the area is provided with assured irrigation for all the year round.

Having examined both the arguments, it appears that in the interest of the farmers, the Government should stop the propagation of the use of tractors in an area which is
monocrop and where irrigation facilities are not assured. In
fact, it appears that there is connivance between the
Government and the tractor manufactures to impose tractors
on the farmers by alluring them to purchase tractors on
liberal terms. However, the Government should encourage
the use of tractors through the co-operative sector. Since
the prices of bullocks are also soaring very high so it is
very difficult for the rural population to maintain a pair
of bullocks. Therefore, such farm services of tractors
would be made available through the co-operative societies
on the basis of payment.

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