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Demand for Mechanization service in Food Crop Production in Oyo State, Nigeria.

O. O. LADIPO ad M.A. ADEYEMO,
Department of Agricultural Economics,
University of Ife,
Ile-Ife, Nigeria.

Abstract

The demand for mechanization service by food-crops' farmers in Oyo State of Nigeria, was studied. It was found that the demand was heaviest in April' May, Agust and September which are the preparatory months for cultivation in each growing season. The quantity of mechanization service demanded declined by 28% in 1979 when compared to 1978.

Mechanization showed a cost advantage over manual operation. One hectare of manually-cultivated land costs N100.00. but costs N6.00 with mechanical cultivation. It is suggested that the government should educate farmers on this benefit, and train more tractor operators and tractor mechanics to ensure a smooth execution of a mechanization programme.

Introduction

Majority of farmers in Nigeria cultivate between one and two hectares annually to produce a wide variety of food crops, depending on the ecological conditions of their area. This characteristic low level of operation cannot be wholly blamed on the food crops farmers when one realises that human labour is only one-tenth horse power.

Realising the importance of agriculture, and considering the major constraints hindering increased food production, successive governments have taken many measures to improve agricultural production and productivity in Nigeria. Some of the measures include:

(a) the establishment of the Nigeria Agriculture and Co-operative Bank in 1973.
(b) the establishment of River Basin Authorities to provide supplementary water for irrigation, apart from drinking.
(c) the introduction of special agricultural projects in conjunction with the World Bank, specifically to produce food crops e.g. the Gusau and Gombe agricultural projects in the North.
(d) the Green Revolution programme which is a followup to the

Operation Feed The Nation. The programme was designed to create an awareness of the food situation, ensure self-sufficiency in food, and mobilise able bodied Nigerians for agricultural production.

Despite all these measures, our farming system is still basically characterised by low farm incomes, food prices are still rising and one wonders whether all the steps taken so far are in the right direction.

This poor food production has been blamed on colonial domination which placed emphasis on production of export crops to the utter neglect of food crops. There was no incentive to produce and sell foodstuffs for cash. It was therefore only lately realised that food production is a very important occupation without which the nation could not survive.

Agricultural production, particularly food crop production, is characterised by a very low level technology. The age-old hoe, cutlass and axe are still the predominant farm equipment of the farmer. The dependence fo the Nigerian farmer on his human power has been, and still is a stumbling block to increased production of food crops; and hence the continuing food problem in the country. One solution to the perennial food problem is to find substitutes for human labour, and evolve better ways of mechanically performing some farm activities. The challenge is therefore now thrown to mechanisation as applied to agriculture. This is even more so in view of the dying, ageing and decreasing popuplation engaged in agriculture.

In discussing agricultural mechanization, we must first understand the farming activities of Nigerian farmers before we venture to mechanize some or all of the activities or operations. The farm operations consist of land preparation which includes land clearing and heaping, planting and weeding, prunning or thinning, harvesting and on-the-farm processing. In economically advanced countries all the operations listed above are mechanized. The infrastructural services required to sustain such total mechanization is not presently within the reach of the farmers. The reasons for this are many. As of now we do not have the manpower to run the machines on any farm, it costs too much to acquire the mach machines and there are no repair services to cater for the machines, among other things. As a first step to mechanization, attempt is therefore made to mechanizing some of the farm operations. This is what we name partial mechanization.

Thus, in this study, partial mechanization denotes the use of mechanical power for land preparation, planting and fertilizer application to add more crops per year, increase yields, improve and preserve the quality of agricultural products, provide better rural living and markedly advance overall efficiency.

Many writers have decried the low food production situation in this country today, but there is little work at present on the influence of partial mechanization on food production. Makanjuola (1977) argued that some farming operation, must be mechanized. If such operation are not mechanized, we would only succeed in perpetuating menial, hazardous and low level productivity. He argued further that the use of hand tools such as the hoe and cutlass suffers many limitations but the most serious of these derives from the fact that the tools must be powered by human muscle. This, he said, is the source of drudgery especially when carrying out energy sapping operations like land clearing, seed bed preparation and weeding.

F.A.O. (1965) recommended that the use of tractors should be encouraged in Nigeria and a survey should be made to determine the true cost of using tractors. As a means of increasing food production, it was recommended that an agriculturist with some engineering training should be employed in each region to develop hand-tools, animal drawn implements and farm transport. Wells (1974) wrote on a wide range of policy measures adopted in the 1962-68 Development Plan in Nigeria. He advocated that during the first Development Plan, effort should be made to ease farm work by expanding tractor hiring units. Essang (1973), wrote on Nigeria Agricultural Development and employment generation. According to him, in the 1970-74 development plan, one of the objectives of agricultural policy was creating rural employment to absorb more of the increasing labour force in the nation. He criticized the policy of agricultural mechanisation that does not pave way for weeding, cultivation and harvesting; which need be intensified.

Even though, various suggestions have been put forward on the need to mechanise farm operations, there are few quantitative studies on the influence of partial mechanization as opposed to manual land preparation on the real income received by farmers and on their economic well-being.

With this as a background, an attempt was made in this study to examine the disparity that ecists in cost of farming operations when human labour is used compared to partial mechanization and the subsequent effect on production capability.

The specific objectives of this study were:

(1) to determine the farmers' response to partial mechanization,
(2) to indicate the economic advantages that partial mechanization could bestow on farmers,

(3) to compare the cost and the benefit of partial-mechanization with those of manual operation.

Theroretical Considerations:

The cost function gives the minimum cost of producing each output and is derived on the assumption that the producer acts rationally. The producer is assumed free to vary the levels of both his cost and output and that his ultimate aim is the maximisation of profit rather than the solution of constrained maximum and minimum problems.

The total revenue of a producer who sells his output in perfectly competitive market is given by the number of units he sells multiplied by the fixed unit price (p) he receives. Profit (π) is the difference between his total revenue and his total cost.

$$\pi = TR - TC$$

Where TR = total revenue
TC = total cost

If the main objective of the producer were profit maximisation, he might achieve it if he could increase his TR at a rate higher than his TC is increasing, or if he could keep his TC constant while his TR increases; or if his TR remains constant while TC is minimised. In this study, the latter was assumed. It is believed that because of the atomistic nature of farming in Nigeria, it would be difficult, if not impossible, for any single farmer to increase his TR appreciably. Even if he tried, the inflation in food prices will invite a public outcry. It is therefore easier and better for the farmer to increase his profit by reducing his TC while his TR remains constant. It is this cost reducing approach which partial mechanisation has made possible, that is the focus of this paper.

Methodology

This study covers partly the reainforest and derived savannah areas of Oyo State in their mechanisation demands for ploughing, harrowing and ridging. The cost of these operations were estimated and compared with what it will be when the same volume of operation is done by manual labour. The data used in this study were collected from five Local Government council areas in which agricultural input services centres were located. The data were extracted from monthly reports on the demand for tractor hiring services for ploughing, harrowing and ridging in 1978/79 and 1979/80 financial years.

The number of months was limited to six months annually covering

April to September. The choice of this was based on the fact that most demands for ploughing, harrowing and ridging were normally made during this period and incidentally, it falls within the rainy season of the year. The rest of the period of the year is commonly termed as the slack period for mechanisation when demand is only made for transporting for haulage of farm inputs.

Results and Discussion

In Table 1, the total area of land for which mechanisation service was demanded in Iwo was 180.0 hectares for the period April to September 1978. The average quantity of services demanded per month was 30.15 hectares. The cost of partial mechanisation was ₦3,526. The same area of land will cost ₦54,270 when manually prepared. Comparatively, in 1979, the mechanization service demanded as shown in Table 2 was 153.1 hectares. The cost of partial mechanization was ₦2806. The same area of land will cost ₦45,930 when manually prepared. In the last column of the table are calculated price ratios. The average price ratio for six months was -064 in 1978 while that of 1979 was .061. The price ratio means for example that in 1978 the cost of partially mechanised operation was only 6.4 per cent of the cost of manually preparing the 180.9 hectares of land for food crops.

In another area (Ibadan), the total area of land for which mechanisation service was demanded in 1978 (Table 1) was 1548.3 hectares. The cost of partial mechanisation was N29,034. The same area, manually prepared, will cost ₦494,490. However, in 1979, total area of land for which tractor services were demanded was 962.1 hectares in Ibadan (Table 2). The same area will cost ₦288,630 when manually prepared. The price ratio in 1978 was .062, and .063 in 1979 (Table 1 and 2 respectively). The price ratio for Ibadan was almost the same, implying that the cost of partially mechanised operation for 1548.3 hectares in 1978 and 962.1 hectares in 1979 was only 6 per cent of the cost when manually prepared for food crops. As revealed in Tables 1 and 2, Ibadan demanded the highest quantity of mechanization because there are more elites in Ibadan who demanded the use of mechanization. Also, there are more Cooperative Unions in this area who are more informed on benefits of mechanization.

In Ilesa, another selected Local Government Council area, the cost of partial mechanisation was N1832.6. The same area in 1978 if manually prepared would cost N33,168. The price ratio for the six months was 0.56. In 1979, the cost of partial mechanisation was ₦1881.8. The same

area of land if manually prepared would cost ₦53,181. The price ratio was .056.

When the total services demanded in 1978 (i.e. 110.56 hectares) is compared with service demanded in 1979, (i.e. 177.27 hectares) for the same centre, there was a remarkable increase of 60.3 per cent in mechanisation service demanded in 1979. The total area of land for which mechanisation services were demanded was 877.52 hectares in 1978, in Oyo Area. The average quantity of service demanded per month was 146.25 hectares. The cost of partial mechanisation was ₦15,643.8 but will cost ₦263,256 when it is manually prepared for food crop. In 1979, land prepared mechanically was put at 676.05 hectares for Oyo. The average quantity of service demanded was 111.68 hectares. The cost of mechanisation was ₦12,571. The same areas of land if manually prepared would cost ₦202,815.

The total quantity of service demanded fell from 877.52 hectares in 1978 to 676.05 hectares in 1979. This was a decline of 22.1 per cent over the previous year.

Lastly, in Irewole area, partial mechanisation service demanded in 1978 showed an increase from 28.8 hectares to 42 hectares in 1979. This is an increase of 45.8 per cent over that of 1978. The cost of partial mechanisation was ₦840. The same areas of land would cost ₦2600 if manually prepared. The price ratio for the period was .067 which implies that the cost of partially mechanised operation is 6.7 per cent of the cost of manually preparing the 42 hectares of land for food crops.

Conclusion and Policy Implications

The study indicated that demand for mechanisation were heaviest in the months of April, May, August and September which are preparatory months for planting of crops for each season. Ibadan recorded the highest quantity of mechanisation service demanded during the the period under study.

The quantity of mechanisation service demanded declined by 287 in 1979 when compared to 1978. Also, there is cost advantage of mechanisation over manual operation when both are compared. Even though the data used in this study were collected from different locations in Oyo State, they all showed similar pattern in the service demanded. It does not appear that, even if the study were made to cover a wider area, there would be a change in the pattern of service demanded. The findings showed a mean price ratio of .061. This implies that if one hectare of land cost one hundred Naira (₦100) when the farm operations are done

manually, it will cost only six naira (₦6) per hectare when mechanised. Thus a farmer could increase his hectarage 16.7 times if he adopted partial mechanisation as opposed to manual operation.

The implication of these findings, especially that of cost advantage of partial mechanisation over manual, is that the government should educate the community on the benefits of partial mechanisation.

The dangers of rapid mechanization have been pointed out by some writers; for example, many farmers may be foreced off the land before the other sectors of the economy are ready to absorb them. Partial mechanization may not force farmers off the land. Through partial mechanization, the farmer may use his time more effectively and get a higher labour income. Timeliness is very important in agriculture for different operations, if the farmer is to receive maximum profit from his farming enterprise. Experience has shown that hoes and cultlasses definitely limit the amount of land the farmers can work and furthermore, they cannot work effectively on their crops unless the units are extremely small. So, it seems we have been so concerned about the dangers of upsetting the social structure in the villages by partial mechanization that we have overlooked the greater danger to this social structure that may arise when farming is not mechanized. Therefore, partial mechanization will lead to better organizational ability and productivity which will definitely lead to greater food output and an increase in our national income.

Finally, efforts should be made by government to provide repair shops, spare parts and fuel. Even more important is the need to provide good training programs for tractor operators and mechanics. Such a training program should include community development principles.

TABLE 1: TOTAL AND AVERAGE COSTS OF CLEARING LAND IN SELECTED AREAS OF OYO STATE IN 1978

Areas	*Quantity of Service demanded and executed in Hectares*		*Costs (₦/Ha)*					
			Mechanized		*Manual*		*Price Ratio*	
	Total	*Average*	*Total*	*Average*	*Total*	*Average*	*Total*	*Average*
Iwo	180.9	30.15	35.26	587.7	54270	9045	.064	.064
Ibadan	1548.3	258.05	29034	4839	494490	77415	.062	.062
Ilesa	110.56	22.11	1832.6	366.52	33168	6633.6	.056	.056
Oyo	877.52	146.25	15643.8	2607.3	263256	3876	.064	.064
Irewole	28.8	14.4	476	238	8640	4320	.056	.056

TABLE 2: TOTAL AND AVERAGE COSTS OF CLEARING LAND IN SELECTED AREAS OF OYO STATE IN 1979

Areas	Quantity of Service demanded and executed in Hectares		Costs (N/Ha)					
			Mechanized		Manual		Price Ratio	
	Total	Average	Total	Average	Total	Average	Total	Average
Iwo	153.1	25.5	2806	467.7	45930	7655	.061	.061
Ibadan	962.1	160.35	18277	3046.16	288630	48105	.062	.062
Ilesha	177.27	26.55	1881.8	313.63	53181	8863.5	.056	.056
Oyo	676.05	111.68	111.68	2095.16	202815	33802.5	.062	.062
Irewole	42	10.5	10.5	210	12600	3150	067	.067

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