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THE CONSEQUENCES OF SMALL RICE FARM MECHANIZATION PROJECT

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AN ASSESSMENT OF CAPACITY OF WORKSHOPS AND FARMERS TO REPAIR AND MAINTAIN FARM MACHINERY IN DISTRICT FAISALABAD: SUMMARY OF MAJOR FINDINGS AND POLICY RECOMMENDATIONS

By

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ABSTRACT

Facilities for repair and maintenance of farm machinery, in District Faisalabad, were evaluated. Machinery breakdowns were concluded to be caused predominantly by improper use and ability to maintain machines was found to be poor. Forty-seven repair shops, employing a total of 211 persons, were surveyed. This provided the basis for a set of recommendations on the need for farmer training in the operation and maintenance of machines, improved training for mechanics and improvements to the capacity of workshops and supply of spare parts.

INTRODUCTION

This study evaluates the facilities for the repair and maintenance of farm machinery, especially tractors, both on and off farms in District Faisalabad. The study was conducted during, and refers to, the year 1978. Eighty-eight tractor-owning farmers, 47 private mechanics' workshops, 11 manufacturers of farm machinery, 2 tractor dealers, 3 cooperative farm service centers, 2 general automobile workshops and 16 spare parts dealers were included in the detailed survey.

The ability of tractor-owning farmers to properly operate and maintain their farm machines was found to be very poor. The widest range of services were provided by the many private mechanics' workshops scattered throughout the District but most of these lacked appropriate tools and equipment. Skilled manpower was scarce both on and off farm. The supply of spare parts was inadequate and costly.

Tractor Breakdowns

Fifty nine percent of the tractors owned by the sample farmers had major breakdowns and repairs during 1978. In all 94 major breakdowns were recorded, affecting 52 of the 88 sample tractors. Twenty-five percent of these occurred during the wheat threshing season. The average period between breakdown and repair, that is, the time the tractor was out of service, was 14 days. The shortest case was five days and the longest 30 days. The frequency of breakdowns was greatest for tractors with a working age between 2 and 5 years (44% of the sample tractors). Each tractor make had its own particular set of problems which led to breakdowns but, in general, the most common were associated with the hydraulic system, fuel pump, dynamo, clutch, stearing mechanism, and water body. The problems were very often caused by misuse of the machine. The cost of misuse and/or poor maintenance was high. The average repair cost of the breakdowns recorded was Rs. 2570/- (ranging from Rs. 1290/ to Rs. 7660/-). Seventy six percent of the average cost went on spare parts, 18 per cent went to the mechanic/workshop, and the balance covered transport and travelling expenses. In addition, there was usually a considerable period when the tractor was out of service.

Farmers recognized that the main cause of breakdowns was improper use by unskilled operators, often themselves. However, they also laid some blame on manufacturing defects, sub-standard parts and adulterated or wrong lubricants. Farmers had poor technical knowledge about tractors. Few understood, or followed, manufacturers' instructions regarding periodic replacement of oil and filters, few owned even simple tool kits or could carry out minor repairs, and few had received formal training in tractor driving and operation.

Tubewell Breakdowns

Thirty electric and thirty diesel tubewells were operating on the sample farms. Twenty one breakdowns were recorded during 1978 seventeen of which were of the electric tubewells. Fluctuating current was the main problem, accounting directly for 14 of these failures. Repair costs were high both in terms of money (average of all repairs to electric and diesel tubewells was Rs. 2440/-) and time out of service (average of all repairs took 44 days).

Thresher Breakdowns

Twenty six percent of the 53 threshers on the sample farms had to be repaired during the 1978 threshing season, several more than once. Sixty five percent of the repairs were done on farm and the average time out of commission was only 4.5 days. The average cost of repairs was Rs. 660/- of which 74% went for spare parts. Poor materials and construction were the main problems.

Tractor Repair Facilities

Ninety percent of all repairs to sample tractors were carried out at private workshops, five percent at tractor dealers' workshops, four percent by the farmers themselves, and one percent at the Government workshop in Faisalabad. None of the sample farmers patronized the cooperative service centres. In 1978 in District Faisalabad there were 146 private workshops, three dealers' workshops, three cooperative service centres, on Government workshop and a number of farm machinery manufacturers and general automobile workshops. Spare parts could be obtained from 76 shops. Special service technicians such as tyre vulcanizers, radiator mechanics, battery specialists, dynamo and auto-electricians and diesel testing facilities were located in Faisalabad and most rural towns, generally clustered with tractor workshops on the outskirts. Half of the workshops and spare parts shops had opened since 1975 when, also, the number of tractors in the District increased substantially.

Government Workshop

The Government workshop in Faisalabad city provided very little service to private tractor owners as its main responsibility was the repair and maintenance of government machinery. However, it did run a training programme for tractor operators.

Cooperative Farm Service Centres

The three cooperative farm service centres in the District were very well equipped with tools, machines, workshops areas and other facilities and represented a total fixed investment of about Rs. 450,000/-. However, they had very little work: between 50 and 75 jobs a month in each of two centres while the third did not work at all. The service centre had been waiting, and its machinery had meanwhile been deteriorating, about four years for an electricity connection. One centre appeared not to be covering variable costs, while the other working centre turned in a small profit. Charges were generally lower than at private workshops and some spare parts were carried and sold at lower prices than at private shops. Despite these evident advantages they were poorly patronized by farmers and represented a very poor return to substantial government investment.

Private Repair Workshops

The great bulk of the repair and maintenance work on farm tractors was done at the 146 private workshops scattered throughout the District. These workshops varied considerably in terms of the skills of their mechanics, experience, facilities, tools and equipment, and hence in their competence to perform repairs and maintenance jobs. All workshops were visited early in the study, assessed, and divided, on the basis of the tools and equipment owned, into the four categories shown in Table 1.

a) Investment

Average investment in tools and equipment is shown in Table 2. For all workshops this was Rs. 6000 of which 95 percent was in major equipment items such as lathes, drills, and grinders.

b) Training

The level of formal school education of the 52 owner-mechanics of the 47 sample workshops was low, but most had attended short mechanics training courses such as those run by Millat Tractors. Probably because of the recent rapid growth in the number of workshops in the District 73% of the owners had less than two years experience as mechanics (Table 3).

c) Employment

Only eight of the sample workshops employed mechanics on a wage basis. In the typical workshop the owner was the only trained mechanics. However, all workshops employed or

otherwise had attached, 'trainees'; boys between the ages of 8 and 16. One hundred and forty 'trainees' were attached to the 47 sample workshops at the time of the survey of whom 36 percent received no payment from the owner-mechanic; the rest received from Rs. 20 to Rs. 150 a month depending on age/experience. 'Trainees' constituted a cheap but largely unskilled workforce while at the same time obtaining informal training and experience in tractor and other machinery repair. Employed mechanics earned between Rs. 100 and Rs. 400 a month depending on experience and, largely because of low earnings, there was a fairly rapid turnover. The sample workshops reported that over time 100 mechanics had left their employment: 47% had transferred to other workshops, 42% had opened their own workshops, and 11% had taken employment abroad. Total employment in the sample workshops was 52 owner mechanics, 11 family mechanics, 8 paid mechanics and 140 trainees, a total of 211 persons at an average of 5 per workshop. Based on the sample workshops' employment records it is estimated that private workshops in Faisalabad District 'employed' about 730 persons of whom 28 percent were mechanics with some formal training. Eighty seven percent of these mechanics were proprietors of workshops, and only 13 percent were employees.

d) Workload

The numbers of repair/maintenance jobs estimated to have been completed by the sample workshops in 1978 were 525 for type A workshops, 367 for type B, 778 for type C and 330 for type D. The average number for all workshops was 500. The more complicated jobs such as engine overhauling went mainly to type A and B workshops. The higher job-rate of type C workshops was due to their more frequent location in rural areas and a willingness to provide on-farm services. Few workshops of any type specialized in particular tractor makes or type of repairs.

There were two marked seasonal peaks for tractor repair work, March-June and October-December, when tractors were most heavily engaged in on-farm work (ploughing, threshing, carting) Forty percent of the workshops reported that they received as much work as they could handle and most of those who could have taken more work were located in urban/rural town areas. Half of the workshops reported that their ability to perform many repair jobs was constrained by a lack of appropriate tools and equipment, that is, by their ability to invest a suitable level. Many claimed that they would be willing to invest more if they could obtain credit on reasonable terms.

Spare Parts Supply

As might well be expected the widest range of tractor spare parts, particularly imported brand-name parts, was available in Lahore from tractor/parts importers and assemblers, and from tractor dealers. Faisalabad city tractor dealers and sub-dealers also maintained reasonable stocks, although there were often reported delays while parts were brought from Lahore. In most rural towns there were spare-parts shops but generally these had very limited stocks of a narrow range of 'fast-moving' parts. While the three cooperative farm service centres in the District maintained stocks of spares, very few of the private workshops did so. Prices varied between tractor makes and between Lahore/Faisalabad and rural towns. Table 4 shows the ranking of the major makes of tractor, with respect to the availability and cost of spares, as perceived by the workshop mechanics.

Farmers and mechanics reported that parts were not always available even in Lahore and that they were often forced to substitute 'inferior' locally made for 'genuine' parts and to adapt parts from other makes of tractor for their machines. There were many complaints about the quality of locally make[1/] and 'Chinese' parts, and most farmers claimed to be ready to pay the higher costs of 'genuine' parts. Prices for all parts available in the rural town shops were considerably higher than in Faisalabad and Lahore; price differences as much as 200% were recorded during the survey.

RECOMMENDATIONS

It is clear that the private and social costs of mechanization of Punjab agriculture have been substantially increased by problems of maintaining farm machinery in proper working order. Frequent breakdowns, delays in obtaining spares and in completing repairs, poor quality of some spares and locally fabricated machinery such as wheat threshers, and a preponderance of partly trained mechanics and inadequately equipped workshops all add to the already high capital and running costs of farm mechanization in Pakistan.

It is also clear from this study that the acquisition of the skills needed to properly use, maintain and repair farm machinery has lagged behind the acquisition of farm machinery, particularly tractors. Given the rapid increase in the number of tractors on Punjab farms over the past five years this is not surprising. However, it is a serious and costly problem which, if left unattended, will substantially reduce the efficiency of the farm mechanization programme.

[1/] Up to the present the quality of farm machinery, etc. manufactured locally has been adversely affected by shortage, or non-availability, of the right type of raw material, especially steel. This situation should be improved when Karachi Steel Mills comes on stream to meet local requirements. In the meantime it might be beneficial to import appropriate types of steel for agricultural machinery fabrication.

The following recommendations are therefore proposed.

Recommendation 1

Farmer training/instruction in the operation and maintenance of tractors and other farm machinery should be promoted through the following components:

1 - Preparation, printing and distribution of simple instructional materials in Urdu/Punjabi with clear illustrations/diagrammes etc. specifically for farmers. Material should be prepared on tractor operation and use and on simple maintenance/repairs. Separate sets of materials should be prepared for each tractor make/model. The material should be given free to all tractor owners in the Province.

2 - Instructional programmes on tractor and related machinery operation and maintenance, abuses and consequences etc. should be given on regular basis at appropriate timings over Pakistan Radio. This could be combined with printed material for more effective learning.

3 - Instructional courses should be provided to farmers in tractor operation and maintenance in all rural towns. This could be a travelling workshop with teachers and materials/equipment giving short courses on a regular basis and schedule throughout the Province. Separate courses in tractor operation and simple repairs should be given.

4 - An organized regular competition developed around tractor driving, operation and maintenance skills should be organized for farmers at tehsil, district and provincial levels with winners moving up at each stage of the competition. Appropriate tests of skills should be designed and appropriate prizes and awards should be given to winners etc.

Recommendation 2

So far the private sector has performed a valuable service to the farmers and the country in providing training and repair facilities in rural areas. Short formal courses for mechanics are given by tractor companies, and private workshops provide an opportunity for young men to obtain at least a 'feel' for mechanics and some basic

skills. However, with the rapid increase in farm mechanization this informal system is no longer adequate and, although it should continue to be used, needs to be supplemented. The following components are suggested:

1 - Apprenticeships: The informal system of "trainees" adopted by most workshops should be strengthened by providing a formal component to on-the-job training. Courses of graduated complexity and skills should be organized in all rural towns for "trainees", and workshops should be encouraged (subsidized) to send their "trainees" to them on a regular basis. On the successful completion of the curse, or at each level of the course, "trainees" should receive a certificate and, perhaps in order to encourage participation, a monetary bonus.

2 - Tractor companies should be encouraged to increase their mechanics training courses. Government assistance may be required (subsidy). It is considered both cheaper and more effective to subsidize the existing private sector training programme and facilities than to set up government training programmes.

3 - Instructional materials in Urdu must be prepared for, and made available to farm machinery mechanics. Tractor companies should be encouraged and if necessary subsidized to do this as much of the material will be make/model specific.

Recommendation 3

That the charge and responsibility for carrying out the components of Recommendations 1 and 2 above be given to a specially set up and staffed section of the Department of Agriculture (or some other appropriate Department). This section must be able to recruit teaching and publications staff, administer subsidies and bonuses etc. and organize training courses and farmers' competitions etc.

Recommendation 4

The efficiency of workshops is affected not only by the training and skills of the mechanics but also by deficiencies in the tools and equipment available to them. Special provision should be made to extend low interest loans to qualified tractor/farm machinery mechanics for the purpose of purchasing tools and equipment for use in workshops located in rural towns and areas.

Recommendation 5

The three Cooperative Farm Service Centres examined in Faisalabad District were not working effectively or efficiently and were not being patronized by farmers. The centres represented a substantial public investment in buildings, equipment and tools. An evaluation of the operation of the Cooperative Farm Service Centres should be conducted by an appropriate institution such as the Punjab Economic Research Institute.

Recommendation 6

Two major problems were identified by the study: the supply of parts in rural areas and the quality of parts and lubricants. The major tractor companies (Millat, Ford, Fiat etc.) should be encouraged to maintain, jointly or separately, well-stocked spare-parts outlets in rural towns of the Province. The companies should be permitted to charge marginally higher rates to offset higher distribution costs but the advantage should still be with the farmers and workshops who will benefit from the proximity of a supply of "genuine" parts.

Recommendation 7

Correct labelling of spare-parts with respect to manufacturers and country of origin should be enforced.

Recommendation 8

Sub-standard agricultural machinery and implements are being manufactured in the Punjab and supplied to the farmers. There is a need to encourage and enforce quality standards and to up-grade the expertize and technical knowledge of manufacturers who have little if any special training and little access to scientifically designed machinery. Training workshops should be arranged during the slack periods, at important manufacturing centres, to expose manufacturers to the technical aspects of manufacture as well as to new designs and machinery items.

Recommendation 9

That annual competition be arranged in order to encourage manufacturers to produce good quality standard products. Cash prizes could be awarded to winners and their products could be advertized free through public sector communications media.

Recommendation 10

That the Farm Machinery Research Institute at Multan collect items of farm machinery/equipment manufactured in Punjab, examine them carefully, and advise manufacturers on design improvements, materials etc.

Table 1. Types of machineshop and number in category: Faisalabad, 1978.

WORKSHOP CATEGORY	TOOLS/EQUIPMENT	NUMBER IN District	NUMBER IN Sample
A	Complete tool kit + special equipment (e.g. lathe)	25	8
B	Incomplete tool kit + special equipment	25	8
C	Complete tool kit only	31	10
D	Incomplete tool kit only	65	21
		146	47

The 47 workshops selected as a sample were surveyed in detail.

Table 2. Average investment in tools and equipment by type of workshop.

WORKSHOP CATEGORY	TOOLS Rs.	EQUIPMENT Rs.	TOTAL Rs.
A	5600	16000	21600
B	3000	16000	19000
C	3700	-	3700
D	1800	-	1800

Table 3. Level of training of workshop owners.

	none	less than 5 years	6-10 years	over 10 years
Schooling (%)	21	28	45	6

	less than 1 year	1-2 years	2-3 years	3-4 years	over 5 years
Institute technical training (%)	28				
Agency technical training (%)	78				
Work experience as a mechanic (%)	52	21	11	2	13

Table 4. Ranking of availability and cost of tractor spares by manifacturer.

	AVAILABILITY 1 = best	C O S T 1=lowest
Massey Ferguson	1	1
Ford	2	2
Fiat	3	2
Byelarus	4	3
International	5	4

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