

SMALL TRACTORS AND IS THEIR USE WORTH-WHILE?

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There has been a trend in the developing countries to look for small tractors as a part of appropriate technology. It is based on the presumption that the farmer will not get rid of the pair of bullock unless he gets a mechanical substitute. It is assumed that small tractor should be available for subsistence holding of 16 acres. Some of the planners think that farmer having holdings of 16 acres are also fewer in number than those owning still a much less an area and therefore tractors should meet their requirements too.

It is fact that ownership of a tractor will give farmer self confidence and he could use it any time he so wants. The planners are also looking for certain pre-requisites and assume that:-

- (1) The farmer would operate the tractors himself.
- (2) To achieve (1) above the tractor has to be simple in construction, easy to operate and within the understanding of the farmer.
- (3) It is easily manageable and repairable at the village level.
- (4) It should do all possible functions which bullocks are carrying out with various indigenous implements.
- (5) It would be economical on fuel consumption.
- (6) It would be able to perform all operations specific seasons..

Holder tractor was standardized for the purpose, but the idea is not being abandoned.

I have the experience of carrying out trials with small tractors having horse power varying between 3 to 20 at Tandojam between 1960 and 1968 a period of approximately eight years. Most of these tractors were two wheeled walking type with plough at the back but some of them were 4 wheeled mounted type too. The four wheelers had scope for carrying more implements and some of them had power take off pulleys for other uses. These tractors were also tried in the then East Pakistan, where a large number of them were imported to meet the planned requirements. Reports coming from that area i.e., Bangladesh contradict of what was planned. The small tractors scheme failed completely as:-

- (1) Farmers could not repair tractors themselves.
- (2) Trained operators were required for these tractors.
- (3) They could not be repaired at the village level.

- (4) They were uneconomical on fuel.
- (5) They could not do operations other than only ploughing and even this was of disputable quality.

What really had happened was a question of economics, which could be explained thus:

- (i) By miniaturization of the tractor, the capital cost is not reduced proportionately. As the size of tractor is reduced the cost per horse powers increases and it some comes 5 times the cost per horse power, as compared to larger tractors of say 50 HP.
- (ii) The labour required overhauling a four cylinder engines of 50 HP or 25 HP would be same. The cost would reduce if the number of cylinder is reduced but no in direct proportion to the reduction in number of cylinders. Thus the cost of repairs per horse power is much greater in case of smaller tractors.
- (iii) By miniaturizing various components or spare parts of tractor the cost is not reduced proportionately i.e., the spare parts of 25 HP tractor will not cost half as much as similar components of 50 HP. The cost difference may just be 10% at the best. Thus the cost of spare parts per horse power, is also more tin case of small tractors.
- (iv) The fuel consumption of small tractors is not reduced in proportion to reduction in horse power. In actual practice the fuel consumption per hors power keeps decreasing with increase in the horse power of the engine. In small tractors consumption of the fuel per horse power is proportionately too high. It does not follow the graphic straight line as is assumed.
- (v) The out put of the tractors in terms of quantity per horse power basis reduces as its size is reduced. This means that if 50 HP tractor is able to plough half acre land per hour. The out put per horse power basis keeps reducing as the horse power of the tractor is reduced. The quality of ploughing is also poorer as size keeps reducing.
- (vi) For their operation small tractor needs the same operating staff as a large tractor. The farmer himself under the present state of his ability will not be able to operate tractor, unless he goes and gets extensive and expensive training some where. Thus the operating cost per area of the land ploughed, increases with small tractors.
- (vii) The time and labour involved in the overhaul of a small tractor is not much less, as compred to a bigger tractor. Even if it is slightly smaller the time consumed in repairs is dis-proportionate to the reduction in power.

Thus it could be seen that small tractors would be uneconomical as compared to larger tractors.

Our experiments at Tandojam over a period of eight years showed another problem. Small tractors lacked power so much that many times they could not plough a land unless it was

flooded with water first and allowed to come to a level of moisture at which small tractor could plough it.

Since there is shortage of water, there is choice between irrigating more land with a quantum of water or allowing this to flood land prior to ploughing. The unfortunate part of the whole scheme of things is that ploughing should take place just before planting and this happens to coincide with Rabi and Kharif planting season. Another unfortunate factor is that pre-planting irrigation doses. The land that has remained fallow would need heavy doses of water like pre-planting irrigation doses, and this would be wasted. The farmer must reduce the area under cultivation by a minimum of 25% to do this pre-planting irrigation for the purposes of ploughing only. This would be major disadvantage of small tractors.

- (viii) Life of a crawler tractor is considered as 10,000 hours. For accepted, 75,000 hours for tractors of 40 to 75 HP, and 6000 hours for tractors of 25 to 35 HP. This applies to the developed countries where tractors are able to perform many type of operations during cropping season and are kept busy. In developing countries this figure is much less and tractors are use only for ploughing and occasionally for transport. My personal experience with tractors and observation of other peoples tractors, has confirmed this view. In Sindh, I do not know of any land-owner who operates a tractor for more that 700 hours annually on the average. Tractor is usually written-off in less than 10 years. Small tractors are used fro still much lesser hours.
- (ix) Because of more break-downs with small tractors, they are off the field much more frequently, than bigger tractors and there fore their utility is reduced.
- (x) Life of certain type of components of tractors would be in proportion to the hours worked irrespective of annual working hours, while life of other type of components would not depend upon hours worked but rather upon their age in months or years, whether in use or not. Components like tyres, tubes, rubber seals, packings, glands, plastic parts and other non-metalic components deteriorate with age and give away due to what is known as age hardening. Thus it is impossible to get full life from a tractor if annual working hours are less, without spending extra amount on their replacement. Since small tractors work less hours annually they would cost more on replacement of its components in their life time.
- (xi) Tractor tyres cost between 30 to 35% of the total cost of the machine. For larger tractors the rear tyres may have to be replaced once in their life time but small tractors they have to be replaced more than once. This extra cost would be reflected in operational cost per hour and hence also on the cost per acre basis.
- (xii) With small tractors the implements have also to be miniaturized. The small tractor for example may need a two bottom plough instead of 4 bottom for a large tractor. Comparing 4 bottom ploughs for 55 HP tractor with two bottom plough for small tractor, it would be seen that small tractor of say 25 HP would not be able to raise and lower 50% of the load of bigger tractor, through its power take-off system. This being the case, manufacturers try to make two bottom plough lighter in weight to suit the hydraulic

lifting capacity of small tractor. This makes small implements much weaker and therefore with less life. The performance is also reduced in proportion to reduction in weight.

- (xiii) The life of the light implements meant for small tractors is much less than life of heavy implements which are supposed to last approximately 3000 hours. This would be extra burden on farmers owning small tractors and implements.
- (xv) In order to manage his tractor and implements farmer must devote some part of his time to repairs and up-keep of these. This would be much more for small tractor than a larger tractor due to more break-downs. On the basis of acreage covered, this will be highly excessive for small tractors. In other words the farmer must leave other jobs to devote extra time if he owns a small tractor. This reduces total area he could otherwise cultivate in a season.
- (xvi) We have to gain from the experience of other countries. U.S.A. would not be a good example as agricultural holdings there, are very big and are getting bigger. In Europe on other hand, individual agriculture holdings are not increasing they are, on the contrary, decreasing. It should therefore appear reasonable that in Europe small tractors would replace the large ones. But the trend is otherwise they are using bigger and bigger tractors to cut down the operational time and thus they save on labour, other overheads and time.
- (xvii) It is assumed that unlike developed countries, we could neither have cooperatively owned tractors nor could have custom operators or contractors renting out tractors to the farmers. This is partly true for cooperatives, which have made now a head way in Pakistan. The custom operators or contractors on the other hand have met extra-ordinary success. Whereas the Government is planning for small tractors, private contractors are purchasing bigger tractors and are working as custom operators and rendering services to community. This is a new revolution which has over-taken the rural areas of Pakistan. Some how or other the planners in favour of small tractors, do not seem to have taken into account this factor . I am sure this process can not be retarded and more and more custom operators would go for large tractors and serve the rural community.
- (xviii) With large number of custom operators working in rural areas at present and availability of this facility of getting these tractors as and when needed, farmers are not going to purchase small tractors, because tractors ownership also means capital investment and devotion of some time and efforts in maintaining it. With the competitive rates at which the present custom operators hire out their tractors, it would be uneconomic to own small tractor. This one factor alone, would be a big blow to the sale of small tractors and their market acceptability.
- (xix) The planners purely on humanitarian grounds would like the farmers to own tractors or and get rid of bullocks, the operation of which is considered a drudgery. The bullocks are dis-appearing very fast on farms. This is mainly a credit to custom operators, who plough fields in shorter time and prepare better seedbed, as compared to bullocks which are still being maintained mainly for transport of grain, straw and other agricultural produce.

Again thanks to Suzuki which gave a strong blow to bullock cart. Bullock carts as means of transport is also disappearing very fast.

- (xx) It was not any question of drudgery to the farmer, as the planners are thinking, that bullocks are disappearing. It is simply a question of allocating extra land for growing fodder, to feed the bullocks. Due to increase in human population but not proportionate increase of area under cultivation, farmer had no choice but to reduce the area under fodder and thereby save himself from starvation. The overall economics of maintaining bullocks and reserving area for their feed has to be compared with cost of tractor ploughing. Even if tractor ploughing may cost some extra money, he saves indirectly by selling agriculture wastes or utilizing these agriculture wastes (straw, chaff, oilcake etc.) for feeding cows and milk animals. Without bullocks again he has this surplus, which is utilized for managing cows or goats for milk and meat. With this economy taken into account, tractor operations offer him a different set of economics.

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