Village level engineering: the importance of the blacksmith in supporting animal traction and agricultural production

by

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Abstract

Rural development programmes aiming to improve animal traction and crop production should include a blacksmith development programme. It is not sufficient to provide central workshops and expect farmers to visit it for spare parts and equipment repairs. The Work Oxen Programme surveyed 30 blacksmiths in the Mabole Valley. Most blacksmiths (83%) were peasant farmers: only 13 had worked on draft animal equipment. By using scrap metal, homemade tools and local charcoal, blacksmiths contribute 80% of the final value of their production themselves. The cost of spares made by the blacksmith is about one third of those made at the Work Oxen Programme workshop. The major problem for the village blacksmith is the availability of materials. For anvils blacksmiths use either scrap metal mounted on a sunken tree trunk or solid rocks. Tools are mainly locally manufactured and hardly any blacksmiths owned a hacksaw or a vice.

Introduction

The blacksmiths in Sierra Leone represent a very important and indispensable group of people that are highly placed in rural areas. Among some tribes in Sierra Leone, the blacksmith is the head of the secret society. This is a significant institution for the education of young people and it is where some important decisions affecting the community are made. The basic activities of the blacksmith are the production and maintenance of agricultural tools for the community. For the Sierra Leone Work Oxen Programme, the blacksmith is becoming the link between the central workshop in which the ox-drawn equipment is made and the farmers.

Any rural programme that focuses its attention on farm development for improved food crop production should include a blacksmith development programme. Given the economic problems of animal traction in many systems, general research and development emphasis should be on producing low-cost equipment that can be made and maintained locally. It should be noted that draft animal utilisation in Asia, Ethiopia, Europe and the Americas developed extensively using relatively simple implements made from locally available materials that could be maintained by farmers and village blacksmiths. It is likely that sustainable equipment designs for African farmers will continue to be those based on materials that are relatively inexpensive, locally available and easily repairable (Starkey, 1986).

It has been suggested that animal traction technology will spread widely in Africa and will create a demand for maintenance and spare parts services (Pingali, Bigot and Binswanger, 1987). Experience in sub-Saharan Africa shows that it is not sufficient to establish central workshops to which farmers are obliged to come for equipment repairs or to get their spare parts. Village blacksmiths, on the other hand, have been most effective in providing repair services. Well-trained blacksmiths can also be useful in establishing equipment assembly or manufacturing capacities. In Sierra Leone some of the Ransome

"Victory" plows bought in the 1930's are still being used today. This is because the maintenance of the plow and the replacement of parts has been done by the village blacksmith (Starkey, 1981).

The blacksmith and his work

The Work Oxen Programme carried out a survey on 30 blacksmiths in the Mabole Valley in March 1987. It appeared that most blacksmiths (about 83%) were also peasant farmers. Their production is repetitive and consists principally of handmade tools such as hoes, machetes, axes and knives. Only 13 out of 30 blacksmiths interviewed had done work on draft animal equipment. This work included the making and sharpening of plow shares and land-sides.

It should be noted that the farmer does not regularly go to the blacksmith for repairs, but only when the tool is completely worn out. This may be because he cannot do without his tool. The blacksmith works with old pieces of metal and charcoal produced locally from firewood and in this way he contributes about 80% of the final value of his production himself.

The cost of spares made by the blacksmith has been found to be about one third the cost of spares made at the Work Oxen Programme workshop. Certainly the product made at the workshop is of better quality. When the blacksmith uses good quality steel, such as that from the leaf springs of cars, he can also make good products.

Problems and constraints

The major problem for the village blacksmith is the availability of materials. The basic materials available to him are scrap pieces of steel from old cars or abandoned railway lines. He has very little opportunity to acquire good quality steel.

The lack of good roads to the villages and high transportation costs militate against the efforts of the blacksmiths in trying to acquire stocks of materials. The blacksmith mainly gets his materials from nearby towns or villages on a day-to-day basis or sometimes these materials are brought by his customers.

The blacksmith needs his income for family consumption and survival and so rarely are blacksmiths able to accumulate capital for investment. There is hardly any possibility of blacksmiths obtaining a bank loan.

The blacksmith's equipment

The method of work of the village blacksmiths is extremely simple. They hardly use standard measurements. The workshop is generally a small circular hut covered with thatch or palm leaves. The forge is often constructed by local craftsmen. Mechanical bellows locally made are also used. The anvil is made from scrap metals and is planted into a tree trunk buried halfway into the ground. Some blacksmiths use solid rocks as anvils. Important tools owned by blacksmiths include hammers, gravers files, pliers, punches and chisels. The survey showed that there were hardly any blacksmiths who owned a hacksaw or a vice.

Conclusion

The importance of the village blacksmith in village-level engineering cannot be over emphasised. His high position in the community, and his important function in the production of agricultural equipment makes him a focal point for rural development. All rural development programmes should aim to enhance the development of village blacksmiths.

Résumé

Tout programme de développement rural visant à l'amélioration de la production agricole devrait inclure un programme de développement spécifique aux besoins des forgerons. Les expériences menées dans les régions subsahariennes ont montré que la création d'ateliers de forge centraux où les fermiers font réparer leurs outils et achètent des pièces détachées n'est pas suffisante. Le Work Oxen Programme a conduit une enquête portant sur 30 forgerons de la Vallée

Mabole en mars 1987. La majorité (83%) sont des fermiers, seulement 13 d'entre eux avaient déjà effectué des réparations d'équipements de culture attelée. 80% de la valeur des produits de la forge provient du travail des forgerons grâce à l'utilisation de matériaux de récupération, d'outils de leur propre fabrication et de charbon de bois local.

Les pièces détachées fabriquées par le forgeron sont 30% moins chères que celles fabriquées par l'atelier du Work Oxen Programme. Le manque de matériau est la contrainte la plus importante de la forge de village. L'atelier et les outils sont faits de matériaux locaux. Les enclumes sont faites à partir de métaux récupérés et montés sur une souche partiellement enterrée ou sur des blocs de pierre. Les outils sont tous de fabrication locale, et il est rare de trouver une scie ou un étau chez un forgeron.

References

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Village blacksmith requirements

The following list contains the tools, metal scraps and steel pieces that might be considered for a village blacksmith development programme

Tools

hand powered grinding machine (160 wheel)
powered blower/fan (manual)
anvil (80 kg)
hand hammers cross plein sledges (1 kg)
hand hammers straight plein sledges (1.5 kg)
sledge hammers (3 to 5 kg)
tongs close bits
tongs flat bits
tongs hallow bits
tongs for bolts
cold cutting chisel
hot cutting chisel
round and square drift (8-10-12-14 mm)
hardy
top and bottom swages
top and bottom fullers
sharpenable flat chisel
hacksaws frame with blades
files round (bastard and second cut)
files flat (bastard and second cut)
files square (bastard and second cut)
triangular saw files
water pump pliers
tin snips
adjustable wrenches (0-26 mm)
open end spanners (10-24 mm)
vice grip pliers
heavy duty vice (100 mm jaws)
tape rules
clamps (tommy bar tightening)
hand powered drilling machine (bench type with flywheel)
drill (from 5 to 12 mm)
circular die stock with circular die M6-M8-M10-M12-M14
wrench with screw-tap M6-M8-M12-M14

Steel raw material (various scrap)

leaf springs (from car and truck)
coil springs
axles
push rods
torsion bars
stick shifts

Other materials

round rod (mild steel 6-16 mm)
metal sheet (high carbon steel of thickness 5-10 mm)