This paper is published in: Starkey P and Kaumbutho P (eds), 1999. *Meeting the challenges of animal traction*. A resource book of the Animal Traction Network for Eastern and Southern Africa (ATNESA), Harare, Zimbabwe. Intermediate Technology Publications, London. 326p.

Users in control: farmer participation in technology research and development

by

Simon Croxton*

International Programme Manager, Food Production
Intermediate Technology Development Group, Myson House, Railway Terrace, Rugby CV21 3HT, UK

Abstract

This paper discusses approaches to technology development. It starts from the premise that animal traction technologies have broad similarities with most other rural technologies, in terms of the constraints and possibilities for development. Fundamental to the argument is that more conventional approaches to technology development do not have a history of promoting widespread innovations. An alternative approach that attempts to minimise the control of professionals and other external agents, and maximise the control of manufacturers and end users, is critical for successful technology development.

Definitive methodologies are not themselves the key to developing more participative ways of working. A key factor is the attitude of professionals, and this needs to be explicitly recognised if more participative approaches to technology development are to be put into practice. The software aspects of technology (skills, knowledge and forms of social organisation) need to be given at least equal weight to the hardware (techniques and equipment). Formal education rarely provides professionals with the skills they require to work in this way.

The paper uses a case study from Sudan to illustrate the discussion. It concludes that resources should be directed more at ways of enabling participative approaches to develop than at research controlled by professionals.

Introduction

Research into, and development of, technologies suited to small farmers in rural areas of developing countries is no easy matter. History is not littered in success stories. If it were, a paper such as this would not be of interest. This does not apply ony to animal traction technologies, but to all areas of rural technology.

This paper examines approaches to technology development. It starts from the above assertion, and also argues that animal traction technologies are not a special case but are just one of a range of technical areas of interest to many small-scale farmers. The issues facing professionals working in this particular field are similar to those associated with other technologies. Therefore, it is useful to look at the possibilities and constraints facing research and development of animal traction technologies from a broad perspective. What lessons can be learned at a general level and how might these be incorporated into practical work in a particular technology?

To ground the discussion in practical experience, the paper illustrates some of the major points with an example drawn from ITDG's work with farmers and blacksmiths in western Sudan. This project has been chosen, not just because it illustrates an alternative approach to technology development, but also because it has been judged successful by external evaluators (Abu Sin and Hadra, 1994) in terms of supporting a major technical innovation—the use of donkey plows in an area where they were never used before.

What do participatory approaches offer technology research and development?

There is a growing recognition that conventional approaches to developing rural technologies have not delivered the goods. This recognition has developed into a well argued critique of the technology transfer model, and considerable interest in, and research into, alternatives based on a participatory approach. These participatory ideas and the associated rhetoric form a major component of what has been described as a new development paradigm (Jamieson, 1987;

* *Subsequent address:* Simon P Croxton
Sustainable Agriculture Programme
International Institute for Environment and Development (IIED), 3 Endsleigh Street, London WC1H ODD, UK

Chambers, 1994). There is now a body of research and information on practical field experience that provides considerable documentation on farmer participation in technology research and development (see, for example, Haverkort, van der Kamp and Waters-Bayer, 1991; Hiemstra, Reijntjes and van der Werf, 1992; Croxton and Appleton, 1994; Okali, Sumberg and Farrington, 1994; Scoones and Thompson, 1994). This paper uses these arguments as a starting point to look at how best to translate theory into practice relevant to the development of animal traction technology.

The basic tenet of these arguments is that users need to be involved at all stages of technology development. Conventional approaches have relied too strongly on researchers and technical specialists identifying constraints and possible solutions, and then attempting to transfer them to rural settings. Local skills and knowledge are frequently not recognised and certainly rarely included, in this process which is managed and controlled by outsiders. In contrast, a participative approach uses existing local skills and knowledge as a starting point, and is built around a process that enables users (eg farmers) to control and direct research and development of technologies that meet needs prioritised by farmers themselves.

Unfortunately, the rhetoric of participation all too often fails to translate theory into practical suggestions. Although almost all donors and development agencies are now increasingly embracing the concepts of participation, this is not always reflected by participative practices in the field. In fact, there is a dearth of information on methodologies. This does not mean that there are inherent difficulties in doing this, but rather reflects the isolation of professionals from experience that will enable them to become involved in and facilitate such a process. Many of the skills involved are merely adapting ideas and methods of participatory rural appraisal (PRA) and community empowerment, such as the ideas of Freire (1968) and Hope, Timmel and Hodzi (1984), to enable farmers to identify and seek solutions to problems they face.

Associated with this is an implicit requirement that professionals recognise that they are equal partners on a voyage of discovery. All those involved have something to contribute. So, whereas there are methodological models that can be used as a guide through this process, the attitude of outsiders is vitally important. This is perhaps a more difficult issue to address. Professionals are inevitably the product of formal education systems. Formal education systems, in turn, are invariably based on assumptions concerning the strengths and validity of Western scientific thought, and do not necessarily validate other knowledge systems. Closely related to this is another assumption that predominates in formal eduction systems: that individuals who have had access to formal education will be better equipped to develop suitable technologies. Unfortunately for many professionals, formal eduction does not provide the opportunity to develop practical interaction skills that facilitate a participative process.

In addition, professional training tends to focus on methodologies: systematic ways of doing a certain activity or range of activities. Seeking the certainty of a formally systematised methodology also poses problems. Experience from the field suggests that there is not so much a definitive methodology, as a range of methods that can be used to develop and sustain a participative process. There is a real danger that if a 'blueprint' methodology is used, then, almost instantly, the dynamic interactions which characterise human behaviour become subsumed by a straitjacket that reinforces control by whoever best understands the practices that are predefined by that particular methodology.

The key concept is that outsiders (ie people from development agencies and technical specialists) are participating in a process that is managed by farmers' rather than farmers participating in something the outsiders are controlling and managing. But for this to happen satisfactorily, conventional views of the relative power and status of various stakeholders need to be challenged. This can be uncomfortable for rural people and professionals alike. Both have frequently been used to ascribing each other with a particular status. This, in turn, defines a certain way of interacting with each other. It can be as difficult for a farmer to relate as an equal to a professional as *vice versa*. Frequently the key skills which teams of professionals lack are those very ones that can enable such new, less paternalistic relationships to develop.

This paper is published in: Starkey P and Kaumbutho P (eds), 1999. *Meeting the challenges of animal traction.* A resource book of the Animal Traction Network for Eastern and Southern Africa (ATNESA), Harare, Zimbabwe. Intermediate Technology Publications, London. 326p.

Experiences in Kebkabiya, Sudan

The work on developing donkey plows with farmers in Kebkabiya was part of a larger agricultural project. This project was based on the concept of community empowerment and around management guided by village level institutions (village committees) which were based on traditional decision-making bodies. Project staff (the outsiders) acted as a catalyst for, and facilitator of, discussion, rather than directing it. This framework provided an environment which enabled farmers to identify and prioritise their needs, and resulted in identifying draft as a major constraint which they wished to tackle.

This groundwork was laid in the mid-1980s and methods of working developed over time. Project staff were aware of approaches and methods being tried elsewhere (but mainly by reading rather than from hands-on experience). Ideas were borrowed that seemed appropriate to their goal of community empowerment. Support was provided to strengthen project staff's confidence and skill in working in this way. They in turn developed and strengthened their own skills so that they were able to support and strengthen farmers' and blacksmiths' own experimental efforts. Approaches to any activity were adopted or rejected on the basis of their potential contribution to increasing the level of control of project activities by farmers, blacksmiths and village committees.

Many of the more refined participative techniques (such as PRA) were not used at the time, but the specific techniques used are not the key issue. What was important, and what this work allowed to happen, was to set in motion a process that would permit farmers themselves to set agendas for action. The idea was to ensure that users would regard themselves as being in control of a technology development process that was addressing an important concern in their lives. This resulted in high levels of interest in issues surrounding draft power, and an atmosphere developed where farmers were keen to experiment.

In addition, there was recognition that manufacturers would be key stakeholders if any technology was to sustain itself on the market, without the support of an external agency. In Kebkabiya it soon became clear that local village blacksmiths were the best placed to manufacture plows. So these blacksmiths were encouraged to join in the experimental process. Project staff only provided initial ideas on plow designs. Blacksmiths' skills and knowledge were explicitly recognised, and they were allowed to lead the process of adapting and modifying designs. This raised the blacksmiths' status, and was key to generating a creative enthusiasm that was a vital ingredient in developing affordable plow designs that worked in farmers' fields.

The informal methods used in early survey work served as a means of building relationships with farmers as much as enabling project staff to learn more about the communities with whom they worked. Both of these factors were regarded as absolutely vital prerequisites of successful technology development. Relationships had to be built where traditional roles and status were re-evaluated. This process took time, but had a major payoff as it was the basis for real research in which all stakeholders were participating.

In truth, this process was not as participatory as it might have been. Survey methods drew on methods that were a reflection of the Rapid Rural Appraisal (RRA) which later developed into PRA techniques. But despite using survey techniques that might be regarded as extractive rather than participatory, there was still sufficient participation in practice to break down barriers between farmers and project staff, and include farmers and their representatives in all key decisions. Similarly, some approaches to training remained fairly formal, especially in the early years. The most important factor, and one that was always a clear goal, was to increase the capabilities and capacity of local people to determine the direction and pace of technology development. The result was that a constructive dialogue developed between farmers, project staff and local blacksmiths which addressed the various issues surrounding plowing.

The issues that needed to be addressed were, of course, complex. In an area where plows had never been in widespread use before, there were few farmers with experience of plowing, and no plows available on the market. In addition, issues of cost and access to draft animals predominated. How was any plow to find its way on to the local market, and who would be able to obtain it?

The implications of this technical change on women (traditionally responsible for the majority of field operations, but also often in an inferior

economic position) needed to be addressed. What were the implications for the poorer families, which the project claimed to be concerned about most?

In the light of these factors, the finer technical details of plow or harness design were of less immediate importance than enabling people to start trying out plows. This would allow them to see if this 'new' technology really was likely to provide an answer to their cultivation problems. The project's objective was more to stimulate farmers to try plows in their fields and blacksmiths to adapt some basic designs to suit their resources. At the same time, the practical experience permitted all involved to gain a better understanding of how the 'soft' aspects of the technology (skills, knowledge and forms of social organisation) needed to be adapted or strengthened to enable the majority of farmers to make use of the 'hardware' (the plow). Prioritising farmers' access to plows to use in their own fields, rather than perfecting plow design, also meant that farmers were able to assess the value of the product (the benefits of plowing in terms of yields, productivity, reduced drudgery, etc).

Developing an atmosphere of research managed by farmers and blacksmiths was not a rapid process, but did develop over time. Project staff had key roles as motivators and in providing ideas. However, these relationships changed slowly, so that key decisions were made more and more by local farmers (and blacksmiths) and the role of the project staff became more and more that of facilitators.

Actual plow designs borrowed existing designs. Two main designs were looked at, one based on a wooden ard (nothing new here), the other on a steel mouldboard plow, a scaled-down version of a standard ox plow, suitable for donkeys. This latter design had been around in the region for a few years, originating in two large development projects based a few hundred kilometres away. However, because the approach to developing and disseminating plows had been different, with the focus on getting the design right, rather than on dissemination and how the market works, this plow had not previously been widely adopted. Technology development had been managed and controlled by researchers, and the process of dissemination had been given less consideration. The more conventional approach did not seek to enable farmers to have any control over technology development and dissemination. In Kebkabiya this approach was turned on its head, with the focus of activity more on getting plows to farmers and letting them do the real experimentation. Manufacturers (in this case local blacksmiths) were able to fine tune basic designs in line with their own skills and resources and also take account of farmers' feedback on performance.

The obvious difficulty some senior project staff members had in working with, and relating to, farmers in a rather different way, hindered the process for some time. The change in status implied by giving equal appreciation of everyone's individual skills and knowledge, challenged conventional concepts of roles and responsibilities. Technical specialists, some with postgraduate degrees, were being required to concede that farmers' and blacksmiths' skills and knowledge were as valuable as their own, and sometimes more so. The tensions this created proved to be a major constraint for several months. However, the prevailing ethos of the majority of project staff was one of sharing experiences and learning together with the community. In this working environment there was no room for self-importance to flourish. Issues concerning the relative status of those with a high level of formal education and those without faded in importance. However, the short-term hiatus that developed was finally only dissipated by the resignation of one staff member.

Currently, project management is in the hands of representatives of local committees, and there is little external support any more (apart from a minimum level of funding to the local management board). However, plows continue to be used by more farmers each season. Farmers are continuing to experiment, and differing designs are being used to cultivate different soil types. Farmers are convinced of benefits. Women are increasingly using and owning plows. Blacksmiths from neighbouring areas are coming to local blacksmiths in Kebkabiya to learn basic designs. Plows are appearing on local and neighbouring markets. Even if local management of an institution that resembles a project fails to sustain itself in the longer term, plowing technology has established itself.

This paper is published in: Starkey P and Kaumbutho P (eds), 1999. *Meeting the challenges of animal traction.* A resource book of the Animal Traction Network for Eastern and Southern Africa (ATNESA), Harare, Zimbabwe. Intermediate Technology Publications, London. 326p.

Lessons and implications

What lessons can be drawn from this rather specific experience? Probably very few concerning the specifics of particular plow designs, or even of the suitability of draft power to farmers elsewhere in similar agro-ecological regions.

What is more important is to note that the widely-recognised 'success' of the animal traction work in Kebkabiya (Abu Sin and Hadra, 1994) owes a great deal to an approach which, over time, enabled farmers and manufacturers to control and manage the technology development process. The technical issues turned out to be less important. It is obvious that a plow (or any other technology) has to be sufficiently well designed to work, but this on its own is not critical for widespread adoption. What seems to be far more important is to look at ways in which outsiders can help to develop an environment where experimentation by farmers and manufacturers is valued—where key decisions are made by farmers (or at least by their representatives on committees). The specifics of methodology are less important than a 'mind set' that seeks ways of ensuring that 'users' are in control of the technology development process. In Kebkabiya, the methods used developed over time, as an iterative process with all stakeholders continually learning from experience.

This has major implications for resource allocation. It suggests that resources are better invested in the 'software' side of technology development (ie, in the skills, knowledge, and forms of social organisation needed to use a particular bit of equipment or technique).

This also has great implications for engineers and technicians. It suggests that their role is less important than those of community development specialists. Engineers and technicians need to review their own attitude to their role and should also seek to acquire skills as facilitators who enable farmers and manufacturers to experiment and adapt technologies. Basic techniques and equipment already exist. Experience shows that these are rarely directly transferable from one situation to another, but they should be seen as easily accessible starting points. Less attention should be paid to perfecting these in research station environments, and more attention paid to ways of working with farmers.

It is interesting to note that in a recent newsletter on agricultural mechanisation in Africa (NAMA, 1994) the vast majority of contributions described work which was fixated on technical aspects. Apart from the isolated observation that simply transferring techniques is unlikely to be effective, not one article looks in depth at approaches to technology development. Where social aspects are discussed, the same old phrases appear. Talking about "providing advice to farmers" or discussing "cultural constraints" does little to move away from a paternalistic approach to an alternative, enabling one. A newsletter such as this is a fairly accurate reflection of the thrust of on-going work in rural mechanisation. The rhetoric of participation may become more commonplace in development literature, but there is clearly still a long way to go before alternative ways of working appear in practice. Yet while constraints are still identified in terms of insufficient resources for research (an argument unlikely to attract attention in these days of continual erosion of funds for agricultural support services generally), there is still a dearth of discussion, let alone practice, which focuses on alternative ways of deploying existing resources.

A common statement is that there is a lack of clear methodology to guide working in this way. Yet although PRA, adult learning and associated concepts can provide guidelines, the example of Kebkabiya shows that it is not so much a refined set of particular techniques that were used, but rather a mind-set on the part of outsiders that provided the guidance to determine approach and probably more important of all provided the guidance of 'what to do on Monday morning'. Looking for a blueprint is counterproductive, for it is only the philosophy and aspects of process that can be transferred from one context to another (Pretty et al, 1995). Our discussions need to focus on these issues far more than they do at present. There may be a role for formal research, but we need to be clear about its role in a wider technology development process.

It is highly unlikely that a major new technical breakthrough in animal traction technology will provide an answer to farmers' problems. The basic technical options already exist. We need to be looking more closely at, and giving more weight to, issues surrounding approaches to developing

technologies that allow these basic, widely known technologies and techniques to be adapted and used by farmers in their own fields. We need to be identifying and looking at ways to best support and strengthen the skills that are required to work in this way. As development professionals we need to continue to look critically at our own values and approaches and recognise that these are as influential in technology development as our other skills as engineers, agriculturalists, economists, and so on.

References

Abu Sin A M and Hadra T O, 1994. *ITDG's support to Kebkabiya Smallholders Project: an evaluation.* ITDG (Intermediate Technology Development Group), Khartoum, Sudan, and Rugby, UK.

Chambers R, 1994. Participatory rural appraisal (*PRA*): challenges, potentials and paradigms. *World Development* **22**(10)

Croxton S and Appleton H, 1994. The role of participative approaches in increasing the technical capacity and technology choice of rural communities. In: *Proceedings of a workshop on technology and rural livelihoods: current issues for engineers and social scientists, Natural Resources Institute, September 1994*. Silsoe Research Institute (Overseas Division), Silsoe, UK.

Freire P, 1968. *Pedagogy of the oppressed*, Penguin, London, UK.

Havercort B, van der Kamp J and Waters-Bayer A (eds), 1991. *Joining farmers experiments*. Intermediate Technology Publications, London, UK.

Hiemstra W, Reijntjes C and van der Werf E (eds), 1992. *Let farmers judge*. Intermediate Technology Publications, London, UK.

Hope A, Timmel and Hodzi C, 1984. *Training for transformation. A handbook for community workers*. Vols 1–3. Mambo Press, Gweru, Zimbabwe.

Jamieson N, 1987. The paradigmatic shift of rapid rural appraisal. In: *Proceedings of the 1985 international conference on rapid rural appraisal, Khon Kaen, Thailand.* Faculty of Agriculture, Khon Kaen University, Khon Kaen 40002, Thailand.

NAMA, 1994. *NAMA Newsletter*. NAMA (Network for Agricultural Mechanization in Africa), Agricultural Development Unit, Commonwealth Secretariat, London, UK. Vol 2, Nos 1 and 2, October 1994.

Okali C, Sumberg J and Farrington J, 1994. *Farmer participatory research: rhetoric and reality*, Intermediate Technology Publications and Overseas Development Institute, London UK.

Pretty J, Guijt I, Thompson J and Scoones I, 1995. *Participatory learning and action: a trainer's guide*. International Institute for Environment & Development (IIED), London, UK.

Scoones I and Thompson J (eds), 1994. *Beyond farmer first: rural people's knowledge, agricultural research and extension practice*, Intermediate Technology Publications, London, UK.

Photo (opposite): Men plowing with oxen in Machakos, Kenya

This paper is published in: Starkey P and Kaumbutho P (eds), 1999. *Meeting the challenges of animal traction.* A resource book of the Animal Traction Network for Eastern and Southern Africa (ATNESA), Harare, Zimbabwe. Intermediate Technology Publications, London. 326p.