IDS Bulletin

Transforming Development Knowledge

ARCHIVE COLLECTION

Volume **54** | Number **1A** | March 2023

POWER, POVERTY, AND KNOWLEDGE – REFLECTING ON 50 YEARS OF LEARNING WITH ROBERT CHAMBERS

Issue Editors **Stephen Thompson and Mariah Cannon**

Contents

This article has been reissued as part of *IDS Bulletin* Archive Collection Vol. 54 No. 1A March 2023: **'Power, Poverty, and Knowledge – Reflecting on 50 Years of Learning with Robert Chambers'**; the Introduction is also recommended reading.

Indigenous Technical Knowledge: Analysis, Implications and Issues

Michael Howes and Robert Chambers

This paper is a selective review and summary of arguments put and points made at the workshop on indigenous technical knowledge[1] for which some of the other papers in this *Bulletin* were originally written. As such, it draws together some of the points made elsewhere in this issue. In attempting to report the gist of the workshop discussions we are not necessarily presenting our views.

What is indigenous technical knowledge (ITK)?

To define the field, it is useful to start by asking in what respects indigenous technical knowledge (ITK) corresponds to and contrasts with institutionally organised science and technology.

Those who have looked at the world from the viewpoint of organised science or of the culture of which it is a part, have conventionally regarded the knowledge of other cultures as 'pre-logical' or 'irrational', and in so doing have either dismissed or greatly played down its validity. In seeking to redress the balance, many proponents of ITK have argued that it is eminently practical and utilitarian. Whilst in some senses true, this statement could also imply that ITK differed from science in that it *only* encompassed areas of direct practical value.

Levi-Strauss (1966) argued forcefully against such a distinction on the grounds that human societies could not, for example, possibly have acquired the skills to make water-tight pots without a genuinely scientific attitude and a desire for knowledge for its own sake. ITK, like scientific knowledge should, therefore, be regarded in the first instance as something which became possible as a result of a more general intellectual process of creating order out of disorder, and not simply as a response to 'practical' human needs such as sustenance and health. Some of the knowledge arising in this way would of course have direct practical applications, and equally new knowledge about the way in which the world worked might arise as the result of a process of inquiry triggered initially by the wish to solve a problem of a 'practical' kind. An appreciation of this underlying similarity between ITK and science is important if the full potential of ITK is to be realised.

An important difference between science and ITK lies in the way in which phenomena are observed and ordered. The scientific mode of thought is characterised by a greater ability to break down data presented to the senses and to reassemble it in different ways. The mode of ITK, on the other hand, is 'concrete' and relies almost exclusively on intuition and evidence directly available to the senses.

A second distinction derives from the way practitioners of the two modes of thought represent to themselves the nature of the enterprise in which they are engaged. Science is an open system whose adherents are always aware of the possibility of alternative perspectives to those adopted at any particular point of time. ITK, on the other hand, as a closed system, is characterised by a lack of awareness that there may be other ways of regarding the world. This is not to say that ITK does not change, but rather that those changes which occur are in nearly all instances comparable to the achievements of what Kuhn (1962) termed 'normal science', or to the detailed working out of relatively minor 'puzzles' within an established 'paradigm' of thought. Science, in contrast, constantly carries with it the possibility of 'revolutionary change' in which one paradigm would be destroyed and replaced by another.

Put slightly differently, science and ITK can be contrasted and evaluated according to three criteria:

—as systems of classification;

—as systems of explanation and prediction;

—in terms of speed of accumulation.

[1] Workshop on the Use of Indigenous Technical Knowledge held at the Institute of Development Studies. University of Sussex. Brighton. UK. 13–14 April 1978. Acknowledgment is due to the members of the workshop for contributions to the discussion and conclusions. They were Mahmadul Alam. Enrique Bautista. Martin Bell. Deryke Belshaw. Ian Carruthers. Robert Chambers. Donald Curtis, Michael Howes. Richard Longhurst. Paul Richards. Sumit Roy, N. Somasekhara. Jeremy Swift and Tony Zahlan.

While ITK and science are comparable on the first criterion, science is generally superior on the second and markedly superior on the third.

ITK can itself be classified in various ways, including:

—in terms of the idioms and conceptual tools through which ITK becomes possible. This can be separated into two clusters—the propensity to classify and the propensity to quantify;

—in terms of the objects towards which thought is directed. Possible subdivisions here include: physical/inanimate (e.g. soils, water, climate); biological (e.g. crops, weeds, pests, domestic and other animals, insects); medical; and energy related;

—in terms of knowledge about fabrication and use of artifacts;

—in terms of knowledge of the operation of the social and economic structures within which production is embedded.

This final category is arguably only admissible under a broad definition of ITK. It includes readily articulate knowledge about such things as markets and co-operatives. It may also include mechanisms of ecological adaptation bound up in rituals such as the intermittent slaughtering of pigs in parts of New Guinea. This raises the question whether people themselves conceive of production activities as separable from social and economic relations.

Regarding the concept of ITK, there are reservations on two grounds. First, it can imply an old/new distinction which is not helpful, since at any time the knowledge available to people is the outcome of processes of transmission and generation which have occurred both within and beyond the local environment. Assimilation of 'outside' knowledge, and synthesis and hybridisation with existing knowledge, are continuing processes. Second, it may over-emphasise the static notion of a stock of knowledge available to be tapped to the neglect of knowledge-generation as a dynamic process.

Changes in ITK

The idea of knowledge as process is useful in showing that ITK cannot be understood independently of the ways in which it changes. Apart from assimilation and synthesis or hybridisation, the basic process of accumulation is, as with scientific knowledge, through experiment. In addition to the examples given in Howes' paper, two further instances of indigenous experimentation can be cited. In one case, in Nigeria, people experimented with cassava when it was first introduced. As cassava can be poisonous, it was important to establish the conditions in which it could safely be eaten. The procedure adopted was to feed it first to goats and dogs. In another case, also in Nigeria, a scientist believed he had made a breakthrough when he found a way of breeding yams from seed, propagation normally being vegetative. A farmer was casually encountered, however, who had not only himself succeeded in doing this, but had also discovered that whereas the first generation of tubers were abnormally small, the second and subsequent generations were of normal size. The scientist reportedly exclaimed "Thank God these farmers don't write scientific papers". It was also noted, in support of the prevalence of experimentation by farmers, that there is a Yoruba word for 'experiment'.

The rate at which new knowledge can be acquired through such forms of experiment is, however, slow compared with science. Stress can trigger innovation; and the development of the bamboo tubewell in India is a recent example of this. But this process can work in reverse, as in the case of the Dogon who abandoned their elaborate system of water use when moving from densely populated upland areas on to the plains. It should also be noted that in general ITK lacks means for systematic and rapid R and D.

The most significant changes in ITK come with the assimilation of small-scale societies to national and international systems. Some of these changes involve uncontroversial adoption of new knowledge. In Botswana, for example, farmers are said to have abandoned traditional categories for classifying cattle in favour of those used in marketing meat. Elsewhere, especially in medicine, there have been cases of synthesis between ITK and science-based knowledge.

But generally, it seems that when ITK and scientific stocks of knowledge come together, synthesis does not occur. One of two things tends to happen: either the two sets of knowledge are isolated from each other (as with the head of an agricultural research station who tried to persuade farmers to adopt monocropping while still intercropping on his own land); or ITK is ignored and squeezed out as inferior. This squeezing out is more common and can lead to loss of confidence among the possessors of ITK as well as to irreversible loss of knowledge.

At the root of the problem lies the fact that officials—agricultural extension staff, planners, research workers, 'experts' and others—depend on scientific knowledge to legitimise their superior status. They thus have a vested interest in devaluing ITK and in imposing a sense of dependence on the part of their rural clients. This suggests that change may only be brought about through an assault at the level of ideology, and through a reorientation of reward systems.

The problem, however, is not just one of stocks of ITK, but of undermining the foundations for indigenous participation in the process of generating new technical knowledge. Thus Mali pastoralists are said to have accepted the dependent status which has been thrust upon them, and now believe that their major hope for salvation lies with the World Bank; and more generally, rural people tend to lack the confidence or inclination to engage in self-help activities in spheres where they have past experience of external assistance. In principle, there is no reason why this process should not be made to operate in reverse—with people gaining confidence and acquiring knowledge as a result of being drawn into the processes of generating technology—but in practice, there is little evidence that this happens.

How to elicit ITK

Some conventional approaches to research have serious limitations for eliciting ITK and finding out how it is organised. Questionnaires impose the compiler's categories upon the respondent and do violence to the latter's meaning system. This may not always be immediately apparent since respondents often adapt to the logical framework implied by their questioner. Difficulties arise where, for example, an extension agent asks for information on yields per acre from a farmer who is more concerned with yields per unit of labour. Problems are compounded when the questioner has a different native tongue from the respondent. The boundaries delineating colours, for example, vary between languages, but these variations may not be recognised; and culturally specific concepts are often hard to translate. Full-scale anthropological methods of observer-participation can overcome these difficulties but they are time-consuming and probably rarely cost-effective. Methods of investigation are needed which are open-ended, quick, and reliable. One such approach is to take part with informants in their work. While this may not enable the observer fully to see the world through the informants' eyes, a high degree of empathy can be achieved by working together, and information and insights may be provided which informants would not otherwise have thought to mention. Another approach is to observe and learn the games people play since these are often how important skills are acquired and practised. It is also often particularly useful to find out about indigenous systems of quantification and to calibrate these against formal scientific measures.

Other ways of eliciting ITK can simultaneously stimulate the creativity of informants. These approaches include the use and adaptation of games as described by Barker and Richards (*infra*).

Uses of the stock of ITK

Can the stock of ITK be used either to economise on the use of scarce trained scientific manpower or to extend the range of observations upon which science can draw?

Instances where this has happened are few, but suggest a considerable potential. Pastoralists, for example, have detailed genealogical knowledge of their animals which can quickly be translated to give a picture of fertility and age-specific mortality. Similarly, work on the variegated grasshopper (*Zonocerus Variegatus*) in Nigeria, which drew on indigenous perceptions, provides a useful basis for determining the seriousness of the problems which they generated, and hence the priority to be attached to remedial action (Barker *et al.* 1977 and *infra*).

Other ways can be suggested in which indigenous observers might—in theory at least—act as 'the eyes and ears of science'. Knowledge of micro-environmental conditions could be used in the preparation of soil maps; local people could be consulted to determine the milk yields of animals under 'real' conditions where scientific testing had not been carried out; indigenous observers might be encouraged to report back on changes in the species composition of pasture as an early warning system for environmental deterioration; farmers could be used in crop reporting systems instead of extension personnel; and so on.

Many such possibilities might be opened up with little technical difficulty: often all that is required is standardisation of systems of measurement. However, one should not simply think in terms of how ITK can be used in isolation, but rather consider ways in which it can be brought into creative synthesis with science. In the environmental sphere, for example, the ideal form of monitoring might well involve a combination of sophisticated satellite technology with observers operating at the local level.

In attempting to mount such an exercise it is also important to recognise that ITK is not distributed evenly among the members of a society. It is likely to be controlled and manipulated by certain groups and classes in the pursuit of their own interests. Sometimes particular types of knowledge are the preserve of 'caste-like' groups such as Twareg smiths; in other cases religious groups like the Marabuts in West Africa are paid and respected as repositories of knowledge. Such interest groups may provide a basis for collaboration, but equally they may stand in the way of change. Elsewhere, variable access to knowledge can arise out of the differentiation of a society into economic classes. In all societies systematic variations in knowledge are likely to be associated with sex and age. In addition, individuals always differ in ability and aptitude.

There are further important practical questions about the way in which knowledge is transmitted between individuals and generations. An understanding of established learning processes might provide a useful starting point for seeing how people could 'draw-down' on scientific knowledge more effectively.

Implications for R and D

How can ITK contribute to the generation and exploitation of technology to benefit rural populations? This can be seen as a question of finding an optimum mix and balance between indigenous participation and scientific participation in R and D processes rather than a choice of either one or the other. What mix is optimal will vary.

It can be argued that formal R and D systems are efficient for generating new knowledge quickly. Whatever the merits of ITK and of R and D activities which involve rural people themselves, the means and methods of scientific research can, in many fields, achieve far more far faster than would ever be possible through reliance on indigenous experimentation. In this view, the urgency of rural development is such that rapid advance to major breakthroughs is essential, and some at least of these have to come primarily through the formal R and D system.

On the other hand, rural people already take the final and crucial decision whether to adopt a new technique. In addition, they often adapt the standard packages with which they are presented to fit their particular needs and conditions. However, it may be only certain people, notably the relatively powerful and wealthy, who normally take part in such decisions.

Certain aspects of knowledge-generation will always have to be centralised and formally organised. Opinions differ, however, about the extent to which this is desirable. Much formal R and D has three phases: problems; a period of development and testing removed from that environment —on a research station or in a laboratory; and a period of re-entry and testing, during which the innovation is brought into the rural environment. For any technology, the question is what balance is optimal between these three. For mechanical and engineering technology, the case appears strong for much more work in the rural environment and with rural people. With seed-breeding programmes, in contrast, a phase in the controlled conditions of a research station is desirable for efficiency. Similarly, in developing a vaccine for cattle, some work in a well-equipped laboratory may be essential. Although opinions differ, it may be generally more efficient, in terms of ultimate benefits to rural people, for much more R and D to be conducted in rural environments and with rural people than is current practice.

Substantial efforts have been made in this direction. Before any radical proposals are put forward, attention should be paid to the experience gained by the International Agricultural Research Centres and by national research institutions. At the same time, there is scope for making these formal systems more responsive to the views and needs of those whom they are supposed to serve. Formal R and D is still struggling to get to grips with the variability of tropical environments, and with the accordant need to decentralise research to involve local people more actively in it. A further general failing is the tendency to see the end product of a research programme as a report or an article rather than a proper evaluation of adoption, benefits and lessons. Also, research activities still tend to carve up reality in a manner which hinders a holistic view of local-level conditions.

To overcome or reduce these problems, six proposals seem worth considering:

(1) *Rural exposure for extension and research staff*
Extension and research staff could be confronted more directly than is usual with the realities to which their work relates. This could be done both during initial training and at intervals thereafter. The repertory grid method (see Richards, *infra*) might serve as a starting point for enabling professional personnel to appreciate the difference between their way of looking at the world and that of the people who were supposed to benefit from their work.

(2) *Checklists*
Checklists could be used to draw attention to factors which might otherwise not be considered in determining research priorities or extension advice. Some examples of factors that may be overlooked with an innovation are implications for women, profitability, effectiveness and efficiency, availability and access to inputs and complementary items, whether a farmer can afford an innovation, risk, social significance and acceptability, lightness for carrying and 'mendability', labour requirements, and effects on diet and on the variety and timeliness of food supply. Checklists have their uses but can be criticised for the implicit assumption that decisions will be made by a small group of people who will determine what is good for others.

(3) *Local-level influence on research priorities*
To improve the criteria chosen in research and then to see they are acted on, producers could sit on the boards of agricultural research stations, following the model of the Kenyan commodity boards. Further, priorities could be set by national research committees which consulted at the local level, although there would be a danger that this would merely reinforce elite preconceptions.

(4) *A cafeteria system*
Farmers could be offered different packages and left to decide for themselves which they would adopt. In Sri Lanka, for example, farmers were provided with 'mini-kits' of different seed varieties, with which they could experiment on their own farms.

(5) *Starting with indigenous practice*
A more radical proposal is that research should take existing indigenous practice as its starting point, seeking to refine this in various ways and then to feed results back into the system. This would go hand in hand with the actual and metaphorical removal of the 'fences' surrounding research institutions so that no aspect of the process of knowledge-generation fell beyond the purview of those whose livelihoods would ultimately be affected. An objection here, however, is that indigenous practice, as with intercropping, growing two or more types of crops together, may be so complex as to be laborious and difficult to test under controlled research conditions.

(6) *Experimental work in rural conditions*
The process might be taken a stage further, perhaps through full-blown experimental work on farmers' fields and with farmers' collaboration. In general, people are more likely to operate and exploit a new technology successfully if they have themselves taken part in its creation.

The validity of this sixth proposal is supported by the extent to which important technical change has taken place and can take place outside formal R and D systems. It turns part of the earlier discussion on its head; instead of asking how experts and scientists can better understand the potential of ITK, the question now is how rural people themselves can assess and utilise the potential of science. To pursue this approach, more has to be known about the way in which knowledge is generated and hybridised and about the potential for different modes of participation. A further need is to see whether ITK can in some way help to stimulate demand which will make R and D respond to the needs of neglected groups and classes.

One objection to this sixth proposal is the earlier arguments in favour of formal science with its implied centralisation. Another is that people can and often do use and benefit from techniques without understanding the technology underlying them. Opinions differ on these points, suggesting a need for research to identify optimal and feasible degrees of decentralisation and modes of participation according to type of technology and social conditions.

Values and rewards

Proposals for using the stock of ITK and for local involvement in R and D can only be adopted easily when lack of awareness is the only constraint. In practice this is rarely the case. In situations where change seems desirable, deep-rooted structural impediments will frequently be encountered. Junior field extension staff, for example, being low in the government service, have a vested interest in exaggerating differences between themselves and local people; and the distinction between 'superior' scientific and 'inferior' indigenous knowledge protects and legitimates their status. In addition most of the proposals presuppose flexibility and initiative at the lower levels in the bureaucracy, but this conflicts with bureaucratic norms. There are also likely to be problems among more senior staff engaged in R and D. Established professional values dictate that rewards should be given to those who make original contributions to knowledge, achieve breakthroughs at the level of theory, and publish their findings in internationally reputable journals; but offer relatively little incentive to individuals to go out on a limb with approaches involving ITK. Changes in values and reward systems are necessary preconditions of progress.

Such changes can be sought directly and indirectly. Possible direct approaches include the award of Nobel prizes and of other international and national medals and distinctions for outstanding work with ITK and for exceptional local-level breakthroughs. For their part, academics can encourage research related to ITK and publish the results in international and national journals. A system of rewards for villages, perhaps along the lines of the former 'village of the year' competition in Uganda, might promote self-confidence and creativity and be linked with ITK. Finally, R and D staff might be rewarded according to the practical result of their work, possibly through an assessment by local people themselves; but in the case of agricultural research, at least, this would prove difficult in practice.

Less direct approaches might involve an attack on prevailing ideology. Initiatives through education can be suggested. Primary school teachers with extensive ITK could be accorded high status and encouraged to communicate their knowledge through the formal educational process. Knowledgable local people could also teach in schools. Third world universities could be encouraged to extend fieldwork for students, on the lines of the useful studies already carried out by Makerere University, the University of Dar es Salaam, and the University of Nairobi. Such exercises need only small research budgets.

Research workers in the richer countries also have an important role to play. By studying and recording ITK and making it academically respectable, they can counteract the ideologies in the name of which it is being destroyed. By encouraging students—particularly those from third world countries—also to adopt this perspective, the effect can be multiplied.

Some outstanding questions

Questions which remain unresolved and questions which may deserve further research include the following:

ITK

1. Do rural people conceive production systems separately from the social and economic structures in which they are embedded? In other words, to what extent, or in what senses, are they aware of their technical knowledge as technical knowledge?

2. How is established knowledge transmitted between generations and individuals? What implications, if any, do such processes have for the appraisal and acquisition of scientific and other knowledge?

3. What are the strengths and weaknesses of different categories of the stock of ITK and what are their potential contributions to rural development?

4. Why does the meeting of ITK and science sometimes lead to constructive synthesis (as sometimes in medicine) but more frequently to the subjugation of ITK by science? How are ITK and scientific knowledge synthesised, and how might that synthesis be improved?

R and D and the generation of knowledge

1. How is ITK generated?

2. In developing scientific R and D programmes how useful is it to start with ITK and with current rural practices?

3. How useful are checklists?

4. What degree of decentralisation and of work with rural people in rural environments is optimal, by type of technology, by phase of R and D, and by social conditions? In particular, how important and feasible is active participation in R and D by the ultimate users of the technology?

5. What demands are exerted or might be exerted by rural people upon formal knowledge-creation systems, and through what modes of participation?

6. To what extent and how successfully have the International Agricultural Research Centres and national research organisations adapted their programmes to take account of ITK, of local environmental conditions, and of particular social groups, and what can be learnt from their experiences?

Professional training and values

In modifying professional values and behaviour, what is the potential of:

1. New reward systems?

2. Games played with farmers and others as part of the training of staff?

3. Research on ITK required to be carried out by extension and research workers, and by their trainers?

References

Barker, D., J. Oguntoyinbo and P. Richards. *The Utility of the Nigerian Peasant Farmer's Knowledge in the Monitoring of Agricultural Resources: a General Report.* Monitoring and Assessment Research Centre of the Scientific Committee on Problems of the Environment, International Council of Scientific Unions, MARC Report No 4, 1977

Kuhn, Thomas S., *The Structure of Scientific Revolutions*, University of Chicago Press, Chicago and London, 1962

Levi-Strauss, C., *The Savage Mind*, Weidenfield and Nicholson, 1966