THE ROLE OF INDIGENOUS KNOWLEDGE IN IMPROVING AND SUSTAINING AGRICULTURAL DEVELOPMENT IN TANZANIA: AN OVERVIEW

D.F. Rutatora
Sokoine University of Agriculture,
Department of Agricultural Education and Extension
P.O. Box 3002, Morogoro, Tanzania.

Abstract

The paper deals with the role of indigenous agricultural knowledge systems in improving and sustaining agricultural development in Tanzania. The paper shows how the inclusion of indigenous agricultural knowledge into the research and extension activities can facilitate agricultural technology utilization by the smallholder farmers in an endevour to promote agricultural productivity. It is argued in this paper that with appropriate utilization of this knowledge it is possible to promote sustainable development. The paper also points out some strategies for tapping this knowledge.

Introduction

Tanzania is predominantly an agricultural country with more than 80 percent of its over twenty million people living in rural areas and deriving their livelihood from land (World Bank, 1989). It is a nation of smallholder farmers most of whom farm less than two hectares of land; and they are characterized by low per capita income.

The economic growth and development of Tanzania depends heavily on agriculture, to which most of the production is by smallholder farmers. Statistics show that agriculture contributed about 61 percent of the Gross Domestic Product (GDP) in 1987 and about 80 percent of all the exports are produced by smallholder farmers (Mattee, 1989).

The government as well as international development agencies recognize that a good number of smallholder farmers are national resource and can help achieve national food self-sufficiency. It is believed that failure to provide increased support for this sector will likely mean a continued deterioration of food security and accelerating deterioration of its natural resource base.

Most of the smallholder farmers in Tanzania are farming under rainfed conditions in diverse and risk-prone environments. Studies show that in a constant struggle to survive, smallholder farmers have developed ways of obtaining food and fibre from plants and animals. In addition, they have tried to adapt their farming systems which have evolved overtime, to local ecological conditions entwined with local culture.

Some researchers (Reijntjes, *et al.*, 1992; Odhiambo, 1991) acknowledge the fact that most agricultural technologies in use in the world today were originally developed by farmers and not formally educated scientists. Reijntjes, *et al.*, (1992, p 35) contends that "innovations are developed and diffused by farmers processes of which many outsiders are completely unaware". It is also recognized that agricultural knowledge that smallholder farmers have generated over many years can provide numerous insights into sustainable approaches to both agriculture and natural resource management (Warren, 1991). A fundamental premise is that smallholder farmers are highly knowledgeable about local conditions and that their knowledge is crucial for informed and successful project results. It is therefore, gradually being acknowledged that good agricultural development must first recognize the relationship between human societies and their total environment in which they find themselves (Titilola, 1991).

The purpose of this paper is to bring to light the potential role that indigenous knowledge and skills can play in improving and sustaining agricultural productivity in Tanzania. The paper first gives the meaning of indigenous knowledge and then highlights such aspects as (i) why should scientists-academicians be concerned with indigenous knowledge- (ii) the potential roles of indigenous knowledge in agricultural development (iii) if indigenous knowledge is so important why has it been ignored?(iv) limitations and (v) strategies to be used to tap indigenous knowledge.

What is indigenous knowledge?

Titilola (1991), Richards, *et al.*, (1989) and Warren *et al.*, (1989) define indigenous knowledge as localized knowledge unique to particular ethnic groups or societies. It is believed to be a consistent and coherent set of cognitions and techniques that has slowly evolved through the trial or error of generations of farmers who had to live by the results. According to Niamair (1990) indigenous knowledge is ever changing and very often borrows selectively from outsiders. Other terms which are used synnymously with indigenous knowledge are such as *local knowledge, rural peoples knowledge, ethnoscience and farmers knowledge* (Van der Kemp and Schuthof, 1989)

Why should scientists or academicians be concerned with indigenous knowledge?

> The knowledge, skills and survival strategies of farmers operating with low levels of input have often been ignored or even eroded by outsiders promoting 'modern agricultural technology. However, with increasing awareness of the limitations and hazards by conventional agriculture, a growing number of scientists have begun to recognize indigenous knowledge as a major untapped resource for developing sustainable agriculture. Local practices offer joining points for developing ways of increasing the productivity and sustain ability of local resources (Odhiambo, 1990 pp. 3)

The use of indigenous knowledge in development can be traced back to the early works of anthropologists and geographers (Barlett, 1980), ecologists (Altieri, 1988) and economists (Norgaard, 1984). Although these researchers were concerned with environmental deterioration and sustainability issues, their works have given renewed interest to the use of indigenous knowledge in agricultural development (Titilola , 1991). According to Titilola one of the reasons for such attention is that most of the technical solutions proposed to address problems of agriculture in developing countries have not been totally successful. For example , one might need to refer to the CIDA supported wheat project in Arusha, Tanzania (Loyns and MacMillan, 1990).

Gran (1986) argues that such solutions have not been successful because they have not taken into account such unique resource endowments as energy availability, ecosystem fragility, skills, preferences and knowledge base of the system. Warren (1991) and Rhoades (1989) argue that farmers knowledge, inventiveness and experimentation have long been undervalued (especially by the research and extension community) and have advocated the one way transfer of technology from scientists to farmers. Titilola (1991) contends that the goals, abilities and constraints of smallholder farmers are frequently suppressed by the existing top-down paradigm in which urban elites define problems, select strategies ,and choose implementing decisions. According to Freire (1970) such strategies and/ or approaches used by urban elites are oppressive in nature and tend to de-humanize human beings.

Dommen (1988) asserts that the drive to achieve agricualtural development without taking into account indigenous knowledge systems and sustainable agricultural practices has proved socially, economically and environmentally unsuccessful. Roling and Engel (1990 p.102) contend that "when taking into account sustainability and economic efficiency, indigenous technologies often, if not usually , out-perform the science -based ones". It is believed that indigenous knowledge is capable of providing alternative methods of viewing and solving agricultural problems. Familiarity with local knowledge can help individual researchers and extension agents to understand and communicate with local people, thereby enhancing the possibility for participatory appproaches to development and sustainability of those efforts. Chambers (1988) had earlier emphasized that we have to put the last (that is, farmers and rural people) first, if Africa is to solve food and economic problems. Chambers futher argues that if we must depend on smallholder farmers for such an important task, it requires that we have to understand them and therefore utilize their knowledge which they have accumulated over a good number of years.

Literature shows that this change in thinking about the use of local knowledge, resources and its implications for agricultural technology development has also led to a reassessment of the relevance of indigenous knowledge for agricultural development. Referring to the work of Atte, Warren (1991) points out that indigenous knowledge is the key to local level development.

From the above, the author contends that we have to debunk the stereotypes we have had about farmers. That is, we should stop considering farmers as ignorant and backward as they have and still continue to contribute a lot toward agricultural productivity in the country.

What are the potential roles of indigenous knowledge in agricultural development

> In general, low resource agriculture meets multiple needs for the families and requires balancing scarce endowments of land, labour, and other resources. This calls for complex decision making and facing difficult trade-offs. A greater appreciation exists now of the efficiency and skill of resource poor farmers and herders although their agricultural systems were once perceived to be inefficient and haphazards. (OTA 1988, p 5).

The agricultural sector of Tanzania is of crucial importance because of its close linkages to the overall development effort through the provision of food, creation of jobs, generation of incomes and provision of industrial raw materials. Currently, however, this sector is neither providing sufficient food nor reducing the associated problems of rural poverty despite the efforts made by scientific research institutions and the international donor community. Mattee(1988), referring to an IDRC Research Report, pointed out that "although over 10 years of IDRC supported research at SUA (Sokoine University of Agriculture) has produced numerous publications and a collection of germplasm, this has not resulted in any useful technology generation and dissemination to farmers". (p.1)

The sustainability of many of the agricultural systems developed through the national and international agricultural research and extension services are now being questioned (Warren, 1991). Warren argues that the high external-input nature of many of the approaches used to increase agricultural production is becoming very difficult to maintain especially in a country like Tanzania. It is argued that as the national budget continues to decline, it is important to recognize indigenous knowledge and organizational capacity as national resources that can facilitate national development at large.

The importance of indigenous knowledge in enhancing agricultural development can no longer be ignored as it is becoming relevant and popular (see Diagnostic Survey Reports of the Miombo Woodland Research Project, 1993). Furthermore, the continued decline in agricultural production in Tanzania has led to a re-evaluation of the role of smallholder farmers in the generation and dissemination of agricultural knowledge.

Some research scientists and extension officers recognize that smallholder farmers have a rich understanding of their resource base and are experts at experimenting and adapting to changes overtime. Titilola (1991), Chambers (1988) and Richards, (1985) among other researchers, argue that smallholder farmers have, over generations, developed skills essential for exploiting their environment and are very active and creative in the ways they use to achieve their objectives. Murphey (1988, referring to the USAID Report, asserts that the smallholder farmers are knowledgeable about their micro-environment (that is, soil and climate) in which they operate, compared to researchers and extension officers working at the national or regional level. For example, the Wandali of Mbozi district in Mbeya and the Nyamwezi of Urambo district in Tabora use the plants to indicate the agricultural potential of their land and thus determine the types of crops to be grown in those localities.

Warren *et al.*, (1989) argue that the role of indigenous knowledge lies in the fact that it optimally utilizes available resources (e.g. return of crop residues to the farm and mulching of banana plantations in Kagera region), explores and exploits existing diversities, takes into account the instability of the environment and provides livelihood whilst appreciating the need to sustain the productive resources base. Compton (1989) and Warren (1979) have argued that an understanding of local agricultural and natural resource management knowledge would strengthen the extension process, particulary by drawing upon the experience of expert farmers and other persons regarded by the community as being knowledgeable about the environment in which they find themselves.

OTA (1986) asserts that the socio-economic appropriateness of indigenous knowledge in agriculture and years of experience of farmers have led to successful techniques such as mixed croping patterns, soil and water management techniques, seed selection, food processing and storage techniques such as use of wood ash by some tribes to protect beans from attack by pests). Some researchers contend that indigenous knowledge can strengthen both the Farming System approach to research and extension (Buttler and Waud, 1990; Collinson, 1985) and the Training and Visit approach to extension (Rajasekaran and Warren, 1991). According to Collinson (1985, p. 84) the farming systems approac "recognizes that local farmers know a great deal more about their own situation and needs than does anyone else, and that these exigencies can and should form the basis of local development projects in the sector". Reijntjes *et al.*, (1992, p. 19) argues that

> The major strength of indigenous farming systems lies in their functional integration of different resources and farming techniques. By integrating various land use functions (eg. producing food , wood, etc; conserving soil and water; protecting crops; maintaining soil fertility) and the use of different biological con.ponents (large stock, small stock, food crops, fodder crops, natural pasture plants, trees, herbs, green manures etc), the stability and productivity of the farm system as a whole can be increased and the natural resource base can be conserved. Indigenous knowledge is an important source of information about the local farming system (including traditional practices which have fallen into disuse), experiences, institutions, culture etc. Above all, farmer's knowledge and skills in adapting new ideas to their local conditions and needs form the basis for the change within the farming community.

Warren (1991) points out that (i) studying indigenous knowledge can increase the effectiveness of communication in several major ways: by targeting the right section of the population and by using the proper vernacular terms in relation to explanations rooted in the formal knowledge sector(ii) understanding indigenous knowledge and perceptions can point to important ideas and practises that are necessary for subsistence, but are often overlooked by formal science and can help in gaining understanding of farmers' perspectives; (iii) factors in a new technology or idea that are of interest

to farmers beyond the primary reason for introduction are often useful leads and can be identified and used in the extension effort; (iv) indigenous knowledge also can be used to understand where a recommendation from formal knowledge may not be possible and compromise is needed (v) technology already known and used in one context can be shared for use in another.

Indigenous agricultural knolwedge has in most cases, already been incorporated into the research and extension enterprise. For example, at the International Potato Centre (Rhoades and Booth, 1982), the International Rice Research Institute (Fujisaka, 1991), the International Institute for Rural Reconstruction (Gonsalves,1991) and at Sokoine University of Agriculture (refer the Bean Research Project with regard to indigenous storage methods) (Mollel, 1994). It is acknowledged in all these cases that successful results have been attained.

Warren (1991) argues that access to and utilization of farmer's indigenous knowledge are critical elements in achieving success in agricultural and rural development programmes. Warren contends that indigenous systems are complementary to formal scientific knolwedge, adding location-specific classification aspects of the biophysical environment as well as explanatory and predictive elements of causal relationships observed by the local people.

If Indigenous Knowldge is important why has it been ignored?

Indigenous knowledge has been neglected due to the following facts: Researchers and policy makers have assumed (over a period of time) that agricultural technology can be generated and diffused only through the efforts of formal research and extension institutions and that this is the scientific way of innovation development and diffusion. Warren (1989) asserts that the 19th century Europian ethnocentricism resulted in negative attitudes about non-western people including their farming systems. Warren argues further that indigenous knowledge has been ignored due to the tendency of governments to respond to the interests of the better organized commercial farmers' groups who can get government attention and loans for various agricultural development activities of their interest.

Limitations of indigenous knowledge

Although indigenous knowledge plays significant roles in improving and sustaining agricultural development, it is not the answer to all problems. The pressure created by rapid population growth and the consequent demand on land has already resulted in negative changes in agricultural production such as reduced fallow periods, decline in yields and nutritional levels, and degradation of natural resource base. In addition, the scope of improvements of indigenous knowledge is limited to what can be done with the local pool of tools, materials and genetic resources. Another limitation is that it is not uniformly distributed within or across communities, and this might influence people's capacity to generate, implement and transfer indigenous knowledge. Kajembe (1994) points out that "among the Mbeere of Kenya, older women know annual herbs best, herd boys know wild edible fruits best, and honey collectors know most about the phenology of plants....." He argues further that even within a group an individual may stand out because of keen powers of observations, prodigious memory, curiosity and intellect (p 39).

Despite these limitations Titilola (1991) argues that indigenous farming principles constitute a foundation upon which modern science can develop scientifically-based but locally acceptable ways of meeting the needs of smallhorder farmers. It is here that indigenous knowledge needs to be supplemented by the scientists' knowledge.

What are the strategies to be used to tap this knowledge?

In order to be able to tap the indigenous knowledge of the smallholder farmers, researchers, extension educators and other people interested in the development of the rural areas are called upon to learn and utilize participatory approaches in all activities meant for the end-users, namely the smallholder farmers. The intent of participatory approaches is that smallholder farmers and other rural people are no longer seen as clients or beneficiaries but as partners in the research and development process. It is believed that with participatory approaches people become empowered with knowledge and the means to decide their own needs and to find their own fulfilment. With participatory approaches it is possible to promote bottom-up linkages

Participatory approaches such as Participatory Rural Appraisal (PRA) (Chambers, 1989), Farmer Participatory Research (Jiggins, 1989), Farmer Approach (Rhoades, 1984) and Farmer Discussion Groups, among others, could be utilized. A cursory look at the Proceedings of the Bean Research (Mabagala and Mollel, 1991) reveal that "Farmers have valuable knowledge that can be put to use for the benefit of both the research and the farmer. In order to nurture that knowledge both farmers and researcher(s) must reach a compromise so that no party should feel a looser "(p.18).

Conclusion

The paper has shown that indigenous knowledge is important for agricultural development activities to be successful on a sustainable basis. This is so because experience and studies have revealed that solutions offered by the scientific community often fail due to the fact that such solutions are not compatible with the local knowledge systems. It has been argued in this paper that familiarity with indigenous knowledge can help experts to understand and communicate with smallholder farmers thereby enhancing the possibilities for participatory approaches to development and sustainability of these efforts.

It is pointed out in this paper that while most indigenous production systems are well adapted to the environment many of them are under stress due to rapid population growth and environmental degradation. In order to offset such problems it is recommended that indigenous knowledge be thoroughly studied and strategies for integrating it with scientific knowledge be determined.

During this era when most national governments are burgeoning while the budgets are declining, it is imperative to recognize indigenous knowledge of smallholder farmers as a national resource worthy of being recorded so it becomes more accessible for the development process. Adding the indigenous knowledge component into the agricultural development paradigm in a formal and systematic manner will greatly enhance the effectiveness of both the farming systems and the training and visit extension approaches. Thus, it is recommended that national agricultural research

and extension personnel must be provided with opportunities to learn the methodologies for systematically recording indigenous knowledge available in every community. From such information the scientific community can build upon these new sensitivities to understand farmers perspectives on and perceptions of risk, problems, needs, and how these can then provide the basis for an interactive system rather the present top-down dissemination of information.

In order to achieve the above, best strategies should be sought and resources must be provided to establish and maintain location -specific, regional and national indigenous knowledge resource centres. These centres will be responsible for establishing a data bank on indigenous knowledge, training and carrying out research on the role of indigenous knowledge in the development process.

In summary, it should be known that indigenous is not a panacea to all evils of agricultural development in the country, but it might provide some highlights on the failures of the agricultural sector.

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