

Chapter 19

Technology Development and Transfer: Lessons from Agriculture

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ABSTRACT

Agricultural technology development and transfer is a driving force for national development. The perspective is to reduce poverty and hunger facing people by adopting new measures to raise income and attain household food security. This is attainable through the establishment of research institutions, extension services, farmer organizations, and public private participation. The primary function of extension service is to deliver efficient and effective transfer of agricultural technologies to farmers as a factor for rural development. The importance of technology development and transfer approaches in developing countries has been recognized as a tool for economic development. Technology development and transfer economics create employment opportunities, reduce poverty, and enhance economic growth. Therefore, better agricultural technologies and better policies can serve as catalysts for economic return. This chapter examines the components of agricultural technology development and transfer and offers implied lessons for emerging technologies like nanotechnology and microelectronics transfer and diffusion.

INTRODUCTION

Agriculture has two ways to increase its output, expanding the land area under cultivation and improving the yields on cultivated land. If agricultural growth and performance taken to increase the farming incomes of rural families, then a third way can be added, i.e. shifting the

product composition to higher value products. For decades, it has been commented that, globally the possibilities for expanding the land area under cultivation are diminishing steadily. Pursuing that route increasingly risks environmental degradation in many parts of the world as forests are cut down and soils on slopes are eroded and degraded. Therefore, the only viable options that remain are increasing yields and changing the product composition (Ellis, 2007). However, while shifting

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to higher-valued crops and livestock products is a sound strategy from the viewpoint of farmers, it does not help to increase food supplies in aggregate. For this reason, the only course left is to increase yields.

In addition, for many poor farmers and less privileged, especially women and youths, who do not have adequate access to diversified markets or cannot fulfill other requirements for shifting to higher valued crops, increased yield is the only route to higher incomes. Increasing agricultural productivity is all the more urgent because majority of the developing world poor are found in rural areas and the sector's average productivity is declining in many low-income countries (Umali, 1997).

The significant majority of the poor continue to depend on agriculture for their livelihood. Of the 720 million poor identified by the World Bank, 75 percent live in rural areas. Thus increasing farmers' incomes through improved productivity is an important element in agricultural policy development and poverty reduction strategies. Yields can be increased dramatically by the application of appropriate agricultural technologies like small scale irrigation system. Adopting irrigation technologies requires the training of farmers and the provision of extension services over a sustainable period, but it can achieve substantial increases in yields without new agricultural research.

The paradigm of involving farmers in research and development based on evidence-enhancing farmers' technical skills, research capabilities, and involving them in decision-making in technology, transfer and adoption process is vital. This would result to innovations that are more responsive to their priority needs, and would surmount the constraints. Linking the technology development process to research, extension and farmer has the potentials to promote agricultural production, and adoption of agricultural technologies (Morris and Doss, 2002, Bozeman et al., 1995). Agriculture follows the principles of nature to develop system conducive for crops and livestock production for

sustainability (Wilson, 1986). Sustainable development of agricultural policies and technology is a social value whose success is indistinguishable from vibrant rural communities, for household food security (Tilt, 2006).

Understandably, agencies that sponsor research and development projects have adapted to the rationale of technology development and transfer as one of the benefits. Appropriate use of better agricultural technologies and better policies are sets of commonly accepted practices of farm economy as a prerequisite for sound economic development. Off-farm, consumers and grassroots farmers' are working to create local markets and farm policies that would support sustainable practices (Day, 2003).

Technology transfer is a kind of spontaneous process from farmer to farmer and from one field to another with the ultimate aim of promoting human welfare (Bozeman et al, 1995). One of the most effective tools has been the acceleration of technological innovation in the developed and developing world (Bell, 1987). Adesina and Forson, (1995) emphasized that, not effective is as an attribute of technological change or adoption to agricultural research and extension but on innovation and the institutional arrangements that favors the implementation of programmes. Cohen and Leviathan, (1990) indicated that agricultural technologies sometimes adapted without any effort if new technology fits farmers' needs and assuming that farmers are knowledgeable and skillful. The idea of research, extension and farmer linkages in the field of appropriate technology transfer and adoption is to bring different stakeholders together acquiring and sharing of knowledge. The participatory technology development approach can strengthen local research and adaptive capacities by involving a vast number of communities based researchers, farmers and extension agents of various government agencies, and NGOs (Blalock, 2004). Just and Huffman (2004) notes that rural labor shortage, and high wage rates to labor saving cultivation methods are necessary

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