Chapter 20
Technology Transfer and Diffusion in Developing Economies:
Perspectives from Agricultural Technology

Edwin. M. Igbokwe
University of Nigeria, Nigeria

Nicholas Ozor
University of Nigeria, Nigeria

ABSTRACT

The early years of the green revolution heralded a new era of technology adoption and increasing productivity in agriculture. This momentum has not been sustained, giving rise to food shortages and widespread poverty in developing countries. This chapter reviews processes and models of technology transfer in agriculture in developing economies and concludes that previous efforts were not demand driven and therefore lacked the ingredients for diffusion. The drivers of technology transfer are discussed. A number of factors responsible for the low rate of technology transfer especially the absence of public policies on technology transfer are identified and linked to the transfer of emerging technologies, mainly biotechnology and nanotechnology. The chapter recommends the development of public policies, development of the private sector, establishment of partnerships between the two sectors and development of infrastructures especially in rural areas.

INTRODUCTION

When the green revolution, characterized by heavy doses of external inputs such as fertilizers and improved seeds, was initiated in the 1960s and 1970s in much of the developing world and especially South Asia, it was hailed as a panacea to the ever recurring incidence of hunger, famine, malnutrition and to some extent diseases. Early evaluation reports showed high levels of technology generation and transfer, adoption and diffusion of technologies and substantial increases in yield. Less than half a century later the developing world is characterized by rising food prices and food shortages and the consequent food riots, poverty and disease and conflicts. In much of

DOI: 10.4018/978-1-61692-006-7.ch020

the region, especially sub-Saharan Africa farmers have reverted to farm 'extensification' rather than intensification resulting to grievous damage to the environment and low productivity. Have the technologies of the green revolution failed or did they ever take root in societies? Can emerging technologies including nanotechnology, micro-processing and biotechnology offer remedies? What lesson can be learnt from earlier processes of transfer of technology?

The chapter examines the models and processes of agricultural technology transfer (adoption/diffusion) and the factors affecting them and draws relevant lessons for emerging technologies. Characteristics of emerging technologies that differ from those of traditional agricultural technologies and strategies that contribute to successful transfer of technology are discussed. Within this context, transfer of technology refers to the process of technology transfer in a social system. This may result to adoption and diffusion in which a technology is selected for use by an individual and the social system. Technology refers to any new knowledge, material or process that improves productivity, and is synonymous with innovation.

AGRICULTURAL TECHNOLOGY

Technology has been a major driver of both the agricultural productivity increases of the past century and the financial success of many farm and agribusiness firms. The challenges of bringing new technology to market in the agricultural industry are changing - it is no longer adequate to conceive a new invention and convince farmers with a strong marketing campaign that they should adopt the technology that results from this invention. Technology, especially in the developing world has, to a large extent, been dominated by multinational corporations looking for large profits. Without the means to buy the technologies they offer, farmers have retained old farming techniques and the result has been a less productive agriculture sector. And with the cautious approach to use of biotechnology in agriculture, farmers have also been unable to benefit from these technologies. Thus many farming systems face low yields, high crop losses, and high production costs.

Agricultural technology focuses on technological processes used in agriculture. The New World Encyclopedia (2008) defines agricultural technology as technology for the production of machines used on a farm to help with farming. Agricultural machines have been designed for practically every stage of the agricultural process. They include machines for tilling the soil, planting seeds, irrigating the land, cultivating crops, protecting them from pests and weeds, harvesting, threshing grain, livestock feeding, and sorting and packaging the products. The definition is narrow as it focuses on mechanization of agriculture leaving out non mechanical processes such as development of improved breeds of animals and crop species/genetic engineering.

Types of Agricultural Technology

Research investment produces two kinds of technology: production technology and research and development (R&D) technology and the corresponding impacts are respectively production impact and institutional impact. Production technology refers broadly to all methods which end-users use to cultivate, harvest, store, process, handle, transport and prepare food crops and livestock for consumption. They are basically physical inputs. R&D technology refers to the organizational strategies and methods used by R&D programs in their work. These are mainly services, like extension advice and capacity building. Production impact refers to the physical, social and economic effects of new technology on crops and livestock production, distribution and use, and on social welfare in general. Institutional impact refers to the effects of the R&D technology on the capacity of research and extension programs