

5. Small-scale Industries in the Popularisation of Science and Technology in Ghana

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Introduction

The development of the technological knowledge and skills needed to effectively exploit available natural resources is an important factor for economic development and poverty alleviation. Whether this implies setting up industries or initiating technological development in areas such as health, agriculture and resource management, it is only by doing so that the countries of sub-Saharan Africa can become self-reliant. Self-reliance does not mean the development of every technology and every basic industry, but adding value to a country's agricultural and mineral resources by establishing basic industries to supply an internal market and earn foreign exchange from exports. Technology must, therefore, be adopted and adapted, but the risk entailed must also be accepted. Greater productivity calls for more scientific research and diversification of inputs such as seeds, pesticides and investment in tools and equipment, as well as facilities for storage and marketing.

Government support of the national science community as an instrument for development is a political decision that strengthens not only the scientists' role but also that of government, and subsequently of the entire nation. Most important of all, however, rapid industrialisation depends not on scientists and technologists, but on society's ability to absorb their findings, inventions and innovations.

The Role of Science and Technology in Development

The role and responsibility of science and technology (S&T) in society is heatedly discussed in every country in the world. Their impact on all spheres of life radically affect the disciplines themselves as well as their interrelationships with society. Social development is becoming ever more closely connected with S&T, especially in the era of information technology, so that today it is hardly possible to speak about social phenomena in isolation from scientific and technical endeavour.

The goal of any country is development, that is improvement of the standard of living and quality of life of its people. This can only be achieved through the mobilisation and utilisation of its natural and human resources. National development must bring sustained improvement of the well-being of the individual and all citizens, bringing transfer of surpluses and income to rural areas to correct historical inequities and imbalances. Such rural industrialisation must be based on mobilising, utilising and maximising the locally available physical and human resources. High population growth rates and rapid urbanisation require expansion of high-quality food processing activities and rural industrial growth to guarantee food security and facilitate the expansion of non-farm employment. Any effective strategy to accelerate the pace of industrialisation must focus on the promotion of agro-based industries.

Small-scale industries and development

Worldwide, micro and small-scale enterprises are increasingly regarded as indispensable components of national economics. Developed countries that in the past relied on large industries, now recognise small enterprises as viable economic activities for many high-tech ventures in terms of subcontracting made increasingly possible by information technology. Historically, micro and small-scale industries played a strategic role in industrialised countries. In Japan, for example, the contribution of a myriad of small entrepreneurs in the nineteenth century gave impetus to the mobilisation of domestic resources for industrialisation and today's industrial giants still subcontract extensively to small companies. As privatisation gathers momentum in Ghana, small enterprises will need to progressively take over industrial operations that are currently owned by the public sector.

Micro and small producers often operate more efficiently at competitive costs for relatively limited local markets. More often, they call for less energy utilisation, less capital intensive technology and less complicated production and marketing processes; they also tend to employ more labour than large industries. Their role must be recognised, defined and incorporated into national industrial policies and strategies to enhance the effective development of the sector.

Promotion of small-scale industries in Ghana

The Government of Ghana established the National Board for Small Scale Industries (NBSSI) to promote industrialisation through small-scale operations initiated and implemented through entrepreneurship development programmes. A major objective of NBSSI is to promote the adoption of suitable productivity-enhancing technologies. Illustration of some of its promotional activities in this direction will be considered below.

The NBSSI has advisory centres in all 10 regional and in some district capitals in Ghana. These centres serve as focal points for the promotion and development of rural entrepreneurship skills to enhance employment generation, adoption of improved technologies and effective utilisation of available natural, human and financial resources. To accelerate the development and growth of rural small-scale enterprises and to strengthen the capacity of existing enterprises in the districts, NBSSI focuses on training entrepreneurs in technical and managerial skills as well as technology transfer and introduction of new business opportunities. The main objective of the NBSSI programmes is to contribute to the alleviation of rural poverty by increasing productivity, employment and income in the rural economy through structured support for agriculture-related, small-scale rural enterprises. Target beneficiaries include artisans and craftspersons, owners and operators of rural small-scale enterprises, apprenticed youth, socially disadvantaged women, unemployed youth and the redeployed.

The purpose of training artisans is to upgrade their technical capacity and their management and training skills so that they can train their apprentices more effectively and thus meet consumer demand for a sufficient quantity of quality goods and services. The NBSSI uses local resources and disseminates suitable technologies in response to demands in the districts. The objective is to provide benefits to small-scale enterprise operators in drudgery reduction, labour saving and improvements in post-harvest operations. The support of NBSSI is also intended to improve the profitability of existing enterprises and promote self-employment. It creates the needed enabling environment for sustained business promotion through providing appropriate tools, support services and training. The Board helps groups form district level, entrepreneurial co-operatives to conscientise them to lobby for national recognition and support. The categories of small-scale enterprises being supported in districts include:

- ◆ Agribusiness and general processing
- ◆ Primary fabrication and repairs
- ◆ Traditional crafts such as pottery, weaving, and catering
- ◆ Service enterprises such as cobblers, chop-bar keepers
- ◆ Agricultural and forest products through support to off-farm activities, as well as to projects with linkages with agriculture such as bee-keeping and mushroom farming
- ◆ Infusing science and technology in small-scale industries.

The Ghana Regional Appropriate Technology Industrial Science (GRATIS), like the NBSSI, was established to support the promotion of small-scale industrialisation in Ghana. GRATIS does this by offering consulting services to small-scale industrialists so that they can upgrade their activities by introducing appropriate technologies, new manufacturing processes and equipment, technical advice and training. GRATIS operates through a network of nine regional Intermediate Technology Transfer Units (ITTUs) apart from the mother centre, namely the Suame Magazine, the first ITTU to be established by the Technology Consultancy Centre of the University of Science and Technology, Kumasi. Basically an ITTU is a production workshop operating and demonstrating activities such as metal machining, welding and fabrication, carpentry and foundry work. The ITTU demonstrates new products and manufacturing processes, trains master craftsmen and apprentices in new skills, promotes the marketing of products and implements a machine tool hire-purchase and working capital schemes.

Promoting S&T through Small-Scale Industries

The rest of this chapter will describe selected activities of the NBSSI in promoting science and technology and their application in Ghana.

The Aiyinase Coconut Development Project

The Aiyinase Coconut Development Project was established as a pilot project in 1995 to promote everyday small-scale technologies for the coconut sector in the Nzema East District, Western Region. An estimated 90 per cent of some 30,000 small holdings totalling 42,00 hectares lie in the Western and Central Regions, with the former alone reported to have over 30,000 hectares with six districts, namely Nzema East, Wassa East and West, Shama-Ahanta East, Twifo-Henan and Lower Denkyira, accounting for the bulk of production. The pilot project at Aiyinase popularises production and utilisation of coconut fibre using small-scale appropriate technologies developed in India and introduced into Ghana by the Commonwealth Secretariat's Industrial Development Unit. The objective is to create employment and improve the quality of life of people in the area.

The project made three retting tanks and installed a defibreing unit consisting of a husk opener, a coconut husk crusher, a sifting machine with a set of combs and sifter screens, a willowing machine and a bailing press. To further prepare trainees, the project made coir fibre spinning equipment for making twine and a unit for making doormats. Batches of trainees are taken through an induction and a hands-on training programme to produce coir fibre. Having acquired the necessary skills, the project provides a loan so that

trainees can buy equipment and set up their own workshops and businesses.

In furtherance of its objective, the NBSSI collaborates with S&T institutions to prepare product profiles on manufacturing processes. Profiles have been completed on extraction of vegetable oil from soft seeds, extraction of palm oil and an intermediate technology for brick production.

The 'Expanded Markets for Cassava' project is an attempt by the NBSSI to facilitate access by micro and small enterprises to science and technology. The project is a collaborative undertaking between the NBSSI and Food Research Institute (FRI), Forestry Research Institute of Ghana (FORIG), Department of Nutrition and Food Science of the University of Ghana, the Ministry of Food and Agriculture and the Natural Resources Institute (NRI) of the UK. The Department for International Development (DFID) of the UK is sponsoring the project under its Crop Harvest Programme. The project seeks to address farmers' needs in finding new markets for cassava and to encourage the development of local products to reduce Ghana's reliance on imported materials. The science and technology institutions in the project are undertaking the following activities:

- ◆ The Food Research Institute is researching the production of high-quality cassava flour for bakery products. FRI is also developing recipes for cassava flour bakery products.
- ◆ The Forestry Research Institute of Ghana has successfully tested the use of high-quality cassava flour as a partial substitute (45 per cent) for imported wheat flour in making glue mixes for two plywood factories in Kumasi. A locally manufactured paperboard adhesive consisting of high-quality cassava flour mixed with a small amount of soluble borax has also been successfully tested as a complete substitute (100 per cent replacement) for imported adhesive.
- ◆ The Department of Nutrition and Food Science of the University of Ghana is researching into production of industrial alcohol and sugar syrups from high-quality cassava flour.
- ◆ The UK Natural Resources Institute co-ordinates all research activities.

The NBSSI is expected to disseminate research results to stakeholders, including policy-makers, businessmen, industrialists and professionals in the plywood, paperboard, bakery, confectionery and catering industries through:

- ◆ Holding awareness seminars in industrial and commercial centres in Ghana, such as Accra-Tema, Kumasi and Sekondi-Takoradi;

- ◆ Production and distribution of brochures based on research results;
- ◆ Organising training workshops for selected stakeholders on the technology of producing high-quality cassava flour and cassava flour-based adhesives for plywood and paperboard production.

The NBSSI also promotes institutions such as the Benlex School of Technology in Tema, established in 1993 to train students to use local raw materials to produce equipment such as hand sprayers and oil cans from empty oil gallons; mouse traps, kerosene stoves and gas cookers from scrap metals; solar stoves from broken pieces of mirrors; and sawdust from wood. The school generates hydrogen for balloons and other experiments, as well as preparing copper sulphate for electroplating. The school uses aluminium for cups, frying pans, plates, trophies, and charcoal and gas fuelled irons. Scrap metal becomes long and flat-nosed pliers, hacksaw and jigsaw frames, and bench vices. Students are trained with equipment for the most part designed and manufactured by the students themselves and graduates can acquire equipment on hire purchase arrangements to start up their own businesses.

Small-scale industries therefore play an important role in popularising science and technology in the country in ways that directly result in poverty alleviation and improve the quality of life of the rural and urban poor.

Conclusion

The development of appropriate technology is crucial for the development of the small-scale agricultural and informal sectors of the economy in the countries of sub-Saharan Africa. Stakeholders in small enterprise development need to research into existing technologies to identify those that need upgrading with innovative designs that will enhance productivity. Access to and dissemination of information about such technologies to the mass of people are essential components of the popularisation process of science and technology.