IUFoST’s strategy to strengthen food security in rural areas of developing countries

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ABSTRACT
One-sixth of the world’s population is food insecure. Many of these people are living in Sub-Saharan Africa. Food insecurity, hunger and malnutrition have multiple reasons, many of which are beyond the reach and capacity of the Food Science Community to remediate. Often food insecurity exists because of a poor understanding of the conditions under which agricultural produce has to be handled, processed and distributed after harvesting; knowledge of Food Science and Technology can dramatically improve this situation. To turn the potentials of the Food Science Community into practical measures, IUFoST’s Food Security Task Force is developing a strategy to expand and broaden the Food Science and Technology knowledge base in neglected geographical areas. Specifically IUFoST is offering Food Science and Technology-training material for nonacademic food industry entrepreneurs and employees by utilizing distance education technology. Part of IUFoST’s effort is transfer of appropriate technologies (drying, thermal processing, chilling and freezing and Controlled Atmosphere-storage) to facilitate introduction of adapted pilot-scale processes which should foster linkages especially between farmers and food industries and stimulate growing high-value crops.

INTRODUCTION
The number of malnourished people in the world is still increasing because the agricultural productivity does not keep pace with the growth of population a further problem is the lack of adequate distribution systems. Agricultural production is suffering because of political, environmental and climatic problems (e.g. lack of irrigation water, soil depletion etc.). Agricultural production and distribution of the production are however not the only factors having an impact on Food security, it must be understood that Food Security exists in a multifaceted system, a system which comprises physical, economic and social access to a balanced diet, safe drinking water, environmental hygiene, primary health care and primary education. Thus, food security, or more appropriately nutrition security, involves both food and non-food factors, both of which require professional and public action. Remediation of the complex problems around food security require completely differentiated approaches, adapted to the individual situation being addressed [FAO 2011].

To evaluate IUFoST’s potential activities targeted to improve the food security situation in Developing Countries, especially in Central and East Africa, factors characterizing the situation in East Africa and, in more detail, in Tanzania as an example will be considered. This perception currently nourishes the expectation that, through educational and training programs -- in the case of the Food Science Community programs related to food production -- sustainable contributions to a secured, adequate and balanced food supply and to poverty alleviation can be provided [Food Sup].

In Tanzania, the farm structure is dominated by smallholder mixed farming of livestock, food crops, cash crops, fishing and aquaculture. The major food crops are maize, rice, potatoes, bananas, cassava, beans, vegetables, sugar, wheat, sorghum, millet and pulses. In Tanzania more than 40 percent of the population lives in chronic food-deficit regions. The country also relies heavily on food imports, especially cereals [CIA],

Tanzania, as one of the countries where agricultural activities contribute to a high share of the GDP, has a rather poorly developed food industry. The reasons for this situation, in the food sector, are manifold and include: severe bureaucratic obstacles, high taxation rates, lack of physical infrastructure (roads, power, water, communication, warehouse, cold rooms etc.). One of the reasons for the slow progress of agriculture and the food industry is at least partially due to the fact that amongst Tanzania’s more than 20 academic institutions only one is fully focusing on agriculture and food processing (Sokoine University of Agriculture) while other institutions are providing food science-related courses [Tan Col].
Ways out of the problem

Case Studies

The progress which can be achieved by the activation of the volition of local populations to remediate their desperate situation and through introduction of modern management principles and targeted educational measures will be illustrated through the example of three food-related cases and one case where tutoring at the grassroots level resulted in very promising business activities.

Case 1: The Kilombero Sugar Company (KSCL): Growing sustainable business in Tanzania [Kilo].
The Kilombero Sugar Company was in disrepair as a government-owned company. The supporting farm infrastructure suffered from high farm plot fragmentation, unclear land tenure, high skill deficiency, poor support services and deficient contractor networks, poor contact between cane grower and sugar processor, almost no access to new knowledge (soil cultivation, cane growing, harvesting technologies), poor seed material, desolate irrigation, etc. Furthermore, poor health services, poor education, lack of clean water and safe food were a major problem.
In an effort to remediate the situation the company set up a system to communicate with cane farmers, supported educational measures including construction of schools, construction of housing, hospitals, clean water supply systems, etc. The infrastructure in the area could be improved, the number of farms could be increased and SMEs in the food industry sector and general industrial sector could be created, with up to 3000 jobs on farms and in SMEs. In more general terms, it was expected and experienced that the Kilombero Sugar Company Project would and did assist in developing a stronger community sense, increase business and technical skills, and create sustainable wealth within the community. In detail better access to new technologies, management support, business information, better access to training measures on soil and plant management, harvesting methods, general manual skills were provided. The number of contract growers almost doubled and the production output increased by 43%.

Case 2: Tanzania Brewers [Tan Brew]
Most of the production facilities were in poor condition, and raw material supply was not sufficient in quality and quantity. To maintain its production, 98% of the raw materials had to be imported including bottles. When the company was reorganized the management decided that all produce and products required for their beer production would be sourced locally, malt, hops and adjuncts, bottles, labels, corks, caps and general supplies. The glass bottle manufacturer and the other supply industries improved the quality of their previously substandard productions. The farmers were trained and supported by the brewery to obtain high quality and high quantity yields. Interesting in these endeavors are also the brewery’s efforts to adapt and introduce new food technologies, e.g., water-saving measures. All these measures resulted in new jobs, improved production a stable infrastructure and very important the supply industry expanded its production into other areas.

Case 3: The Unilever Novella Project (Allanblackia Project) [Unil]
Unilever was interested in integrating into its raw material portfolio an agricultural product that would help promote biodiversity, sustainability and poverty alleviation in Eastern Africa, especially in Tanzania. Suited for the project was the Allanblackia nut (AB); AB oil is used locally for frying. It was known that AB oil could have a much wider application than for occasional frying of local African foods. The Allanblackia tree grows in parts of West, Central and East Africa primarily in tropical rainforests. In detail the AB supply chain comprised six steps: cultivating, collecting, stabilizing, transporting, processing (crushing and oil recovering as a completely new technique for the personnel involved), and exporting. Agricultural challenges include: cultivation of AB, harvesting (collecting) and nut stabilization by drying; the crop farmers were trained by NGOs with the support of the preliminary organized Tanzania AB-Board to obtain higher yields. Infrastructure improvements were supported by national and international development programs. The company also provides practical help to the farmers and assures prompt payments to the farmers. Furthermore, supporting measures to ensure quality production have to be put into place such as continuous training of farmers and processors, improvement of infrastructure etc. Around 10,500 farmers have been mobilized and trained to collect and plant new trees (100,000 planted to date). The planting of AB trees will lead to a marked increase in supply volumes, thereby increasing the impact on rural income levels.
Case 4: Tanzanian Women Entrepreneurs, Spearheading Development in the Food Industry [Tan Wom]

In 1993 an integrated Training Program for Women Entrepreneurs in the Food Processing Industry was designed by Tanzania’s Small Industries Development Organization (SIDO) and UNIDO. The program focused on women from all parts of Tanzania who were interested in entrepreneurial operations and had already some experience in small-scale food production but lacked technical and entrepreneurial skills. The program comprised three month of standard training courses as well as refresher courses. The courses were presented by persons with experience in training entrepreneurs, business development or food technology. Instruction materials and manuals were in Swahili. Specifically the manuals addressed entrepreneurial awareness, technology and management skills, emphasizing food technology-related subjects like processing of fruits and vegetables, extraction of edible oil as well as the manufacture of cheese, butter, bakery products, sausages and fruit wines. Cleaner and safer production through improvements in personal and general hygiene and sanitation, waste management and environmental issues were incorporated into the training. In order to develop a sustainable basis for the community of Micro- and Small-Enterprises (MSE), the women founded the private Tanzania Food Processing Association (TAFOPA). Its aims are: to identify marketing strategies, markets and selling opportunities and points, to identify joint production projects to form production clusters, to evaluate industrial strategies for micro, small and medium sized enterprises, and to identify production constraints and solutions for improved processing. The turnout was extremely positive; the women founded a major number of sustainable Micro-Enterprises which were of economical relevance for the country.

What are the lessons which can be learned from the case-studies?

First of all there is definitely a need to increase and stabilize agricultural production in Developing Countries in a sustainable way. In the case of Tanzania, expansion of agricultural production is certainly of high relevance. Although extremely important, the production aspect is not of central concern to the Food Science Community. The central task of the Food Science Community is the transformation of agricultural produce into edible food and cash-generating products. An important step to improve the situation in Tanzania with food science-related measures is the reduction of post-harvest losses. Of extreme importance however is the sustainable development of a largely autonomous food industry. Maize, rice, potatoes, bananas, cassava, beans, vegetables, sugar, wheat, sorghum, millet and pulses, as well as tea, coffee, pyrethrum, sugar cane, sisal, horticultural crops, oil-crops, cloves, tobacco, coconut and cashew nuts are the basis for a growing food industry, reduction of Post-harvest losses and subsequent processing [IUFoST2].

Post-harvest losses can be attributed to a large variety of factors and reasons. Even in situations with well-established production lines, it would be helpful to reconsider the production range and enter into some strategic considerations as there are: analysis of marketing potentials, production potentials with regard to climate and weather, soil fertility, irrigation potentials. Points to consider include also the infrastructure including an energy supply network fit to respond to all energy requirements (electrical energy, thermal energy), a water network fit to handle a clean water supply and waste water management. The technical background comprises access to mechanical workshops to handle repairs and construction of smaller processing units, access to storage facilities to store incoming unprocessed and outgoing processed products, access to analytical facilities to monitor and control quality of incoming unprocessed (raw) materials and outgoing finished products.

Most important for processing raw material after harvesting is the human factor it comprises a workforce fit to handle all challenges connected with processing, a workforce well-educated and well-trained. Educated and trained in handling a multitude of technical and management tasks, commercial business, and strategic planning.

The benefits of a post-harvest processing system and processing at large close to the origin of agricultural production are not limited to simply utilizing local production. Other considerations include that food processing units in rural areas create employment, challenge the educational system, and help to reduce poverty, stabilize social systems, and improve the abilities to handle complex systems.

On the consumer side processed foods secure food safety, reduce the costs for food, reduce the time spent for preparing meals a fact which is especially of interest for women because it frees time for wage work and other beneficial activities.
In the case where new post-harvest processing technologies, new processing technologies or equipment are being introduced to rural areas, again certain requirements have to be met including technologies rooted in local/traditional techniques, they could serve as stepping stone to more advanced technologies. Possible processing steps following first post-harvest measure should upgrade and increase the value of the agricultural output with minimum processing losses, should include waste utilization and other measures, should secure and improve food supply, and should contribute to sustainability of agricultural production. Possible practical post harvest and processing measures in Tanzania and other EAC countries are the production of traditional and newly developed products e.g. juices, nectars and wines, fermented/pickled fruits and vegetables, canned fruits and vegetable, dried fruits and vegetables, controlled atmosphere treated fresh fruits and vegetables, flour preparations, bread and other bakery products, potato/cassava products like crisps, fresh and fermented milk products and, peanut butter.

What is IUFoST’s Contribution?

To turn the potentials of the Food Science Community into practical measures IUFoST’s Food Security Task Force has developed a four thrust model. This model consists of the exploration of suitable sites, an educational thrust, a training thrust and a technology transfer thrust [IUFoST1].

In an alpha-test of IUFoST’s distant-assisted training project, the introductory food dehydration module was successfully tested. The thrust is directed towards female entrepreneurs, mainly from small-hold farms and small private companies. Part of IUFoST’s effort is transfer of appropriate technologies (drying, thermal processing, chilling and freezing and Controlled Atmosphere-storage) to facilitate introduction of adapted pilot-scale processes which should foster linkages especially between farmers and food industries and stimulate growing high-value crops.

REFERENCES
[IUFoST1] IUFoST Distant Education Project http://www.iufost.org/Education-Training