IUFoST’s strategy to strengthen Food Security in rural areas of Developing Countries
Walter E.L. Spiess 1), Daryl Lund 2), Don Mercer 3)

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 be remediate. Wherever Food Insecurity exists because of a poor understanding about the conditions under which agricultural produce has to be handled, processed and distributed after harvesting, Food Science and Technology knowledge can play a decisive role in improving the situation dramatically. 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/Technology knowledge base in neglected areas. In detail IUFoST is offering Food Science/Technology oriented course material for training of nonacademic Food industry entrepreneurs by utilizing distance education techniques. Part of IUFoST’s effort will be a transfer of appropriate technologies (Drying, Thermal Processing, Chilling and Freezing and CA-Storage etc.), the introduction of adapted pilot-scale processes should especially foster linkages between farmers and food industries and stimulate growing of high value crops.
Introduction

The number of malnourished people is still increasing, in 2009 the one billion mark was overshoot as demonstrated in Fig. 1 (FAO 2011), however it is expected that the number of those who are suffering under the lack of sufficient food had been reduced in 2010 and that in the years to come the number of malnourished can be reduced further on.

Fig. 1 Number of undernourished people in the world

In 2010 the number of malnourished people was estimated to be 926 million with the majority living in Asia and the Pacific Region followed by Sub-Saharan Africa. Fig.2.

![Pie chart showing undernourishment in 2010 in millions by Region (FAO 2010)](chart.png)

<table>
<thead>
<tr>
<th>Region</th>
<th>Millions</th>
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<tbody>
<tr>
<td>Developed countries</td>
<td>19</td>
</tr>
<tr>
<td>Near East and North Africa</td>
<td>37</td>
</tr>
<tr>
<td>Latin America and the Caribbean</td>
<td>53</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>239</td>
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<tr>
<td>Asia and the Pacific</td>
<td>578</td>
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Total = 926 million
The reasons for this human catastrophe are manifold, besides unfavorable weather and unfavorable environmental conditions, especially unfavorable political/social/cultural conditions and the absence of any supporting resources for a sufficient and healthy nutrition have to be mentioned. Further factors are an inadequate utilization and exploitation of the available resources and an inadequate economical basis for a healthy life.

Considering individual hotspots of hunger it becomes obvious that significant improvements have been achieved especially in countries with rather stable political systems, e.g. South America and in Europe (Balkan) which is very often overlooked. No improvements have been achieved in areas with political unrest or the absence of any rule of law e.g. Central Africa as demonstrated in Fig. 3.

Special situations prevail in India where after production heights in the “Green Revolution” period the agricultural productivity is decreasing because of environmental and climatic problems e.g. lack of irrigation water, soil depletion etc..

The remediation of the complex problems around Food Security and require completely differentiated approaches adapted to the individual problem envisaged. It must be understood that when speaking about Food Security a complex system is being addressed, 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 better to say Nutrition Security involves both food and non-food factors from the point of view of professional and public action. (M S Swaminathan)

In order to evaluate IUFoST’s possibilities to engage in activities which are targeted to improve the Food Security situation in Developing Countries especially in Central and East Africa some factors characterizing the situation especially in East Africa and in more detail in Tanzania will be considered. East Africa is insofar of interest because the Republics of Kenya, Uganda, the United Republic of Tanzania and also Rwanda and Burundi have committed themselves to a close cooperation in the East African Community (EAC) as a regional intergovernmental organization and what is more relevant that important segments of the population of those countries believe that with the formation of this community many obstacles for a solid and sustainable development have been removed; this perception of the present time situation nourishes the expectation that through educational and training programs -- in the case of the Food Science Community programs related to Food Production a sustainable contribution to a secured, adequate and balanced food supply and to poverty alleviation could be made.

Tanzania is of special interest because it showed in the last years a continuous economic growth, the average growth of the GDP in the last was around 7%, the growth in 2009-10 amounted to 6%.

EAC comprises an area of 1.82 million sq. km and a population of 133.5 million people, the GDP amounts to $ 74.5 billion (av. GDP per capita $ 409). Agriculture is the most important industrial sector in the Community, 80 percent of the population is living in rural areas and depending on agriculture for their livelihood. With declining tendency agriculture accounts for about 44% of the GDP in Burundi and Tanzania, 30% in Uganda, 24% in Kenya and 38% in Rwanda. (EAC Agriculture 2011)

In Tanzania the farm structure is dominated by smallholder mixed farming of livestock, food crops, cash crops, fishing and aquaculture. Smallholder farmers do not utilize fully the large land resource available as out of the 44 million ha classified as suitable for agriculture, only 23 % is under cultivation. Individual farmers cultivate between 0.2 and 2.0 ha with an average per capita holding of only 0.2 ha per household. The central problem of the farming community is the almost exclusive use of the hand hoe, it limits

• The size of the land which can be cultivated,
• The spectrum of crops and
• The productivity per hectare.

All factors which lead to an insecure food supply even in agricultural areas. The major food crops are maize, rice, potatoes, bananas, cassava, beans, vegetables, sugar, wheat, sorghum, millet and pulses. Some of these are also sold and could be regarded as cash crops. Cash crops include: tea, cotton, coffee, pyrethrum (a natural insecticide made from the dried flower heads of C. cinerariifolium and C. coccineum) sugar cane, sisal, horticultural crops, oil-crops, cloves, tobacco, coconut and cashew nuts. The livestock sub-sector consists of cattle, sheep, and goats, mainly for meat and milk production; pigs and poultry for white meat and eggs respectively; hides and skins for export and industrial processing. Fisheries products include both fresh water fish from rivers, dams and lakes and marine fish from the Indian Ocean. Forestry products
include fruits, honey, herbal medicine, timber and wood for fuel (CIA: The World Fact Book; R. M. Shetto, AED-2005)

Despite this wide range of produce the population of the Community relies heavily on imported food i.e. Food Aid. In Tanzania more than 40 percent of the population are living in chronic food-deficit regions, the country is also heavily relying on food imports especially on cereals. Tanzania as one of the countries where agricultural activities contribute with a high share in the GDP has a rather poorly developed Food Industry i.e. that the potentials of agriculture are by far not utilized to feed the population and generate income. Amongst the EAC countries structural data are best documented accessible for Tanzania.

Important production areas are beverages including beer and fruit juice preparations and canning of various produce.

<table>
<thead>
<tr>
<th>Industry</th>
<th>Value added to GDP</th>
<th>Share in manufacturing industry (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ISIC Revision 3)</td>
<td>2003</td>
<td>2007</td>
</tr>
<tr>
<td>Production, processing and preservation of meat, fish, fruit (151)</td>
<td>10.3</td>
<td>12.3</td>
</tr>
<tr>
<td>Manufacture of dairy products (1520)</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Manufacture of grain mill products, starches and starch prod (153)</td>
<td>7.1</td>
<td>8.8</td>
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<tr>
<td>Manufacture of other food products (154)</td>
<td>6.5</td>
<td>9.2</td>
</tr>
<tr>
<td>Manufacture of beverages (155)</td>
<td>26.1</td>
<td>23.6</td>
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Sources: UNIDO Statistical Country Briefs; CIA, The World Fact Book

Table 1 Value added to GDP by selected Food Industries-Share in manufacturing industry

A considerable problem for the development of the industry at large is that the formal industrial sector comprises only 30% of the 3 390 000 workers, i.e. that majority of the workforce is working in the informal industrial sector a fact which is also true in the food industry sector. The reasons for this situation especially in the food sector are manifold; some are severe bureaucratic obstacles, high taxation rates, limited access to finances and lack of a physical infrastructure (roads, power, water, communication, warehouse, cold rooms etc.). A further problem is the lack of skilled workers and the high rate of illiteracy (30% of the total population can not read and write either Kiswahili (Swahili), or English, or Arabic (male ~20 %, female~37%). This is not only true for the industrial sector but also for agriculture which is poorly managed in every respect as illustrated by the high post harvest losses for cereals (see Table 2); under normal conditions those losses amount to 2% with maxima around 5%. 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) other institutions are providing food science related courses.

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<tr>
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<th>2003</th>
<th>2004</th>
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<th>2006</th>
<th>2007</th>
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<tr>
<td>Maize</td>
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<tr>
<td>Sorghum</td>
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<td>12.5</td>
<td>12.5</td>
<td>12.5</td>
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<tr>
<td>Millet</td>
<td>12.2</td>
<td>12.3</td>
<td>12.3</td>
<td>12.3</td>
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<tr>
<td>Rice</td>
<td>11.2</td>
<td>11.1</td>
<td>11.2</td>
<td>11.2</td>
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</tr>
<tr>
<td>Wheat</td>
<td>14.4</td>
<td>14.4</td>
<td>14.4</td>
<td>14.4</td>
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</tbody>
</table>

Table 2 Estimated Post Harvest Losses (%) 2003 – 2010 Tanzania

Ways out of the Problem

Case Studies

Despite all this shortcomings Tanzania is considered as one of Africa better performing countries. Because of the many administrative and infrastructure related problems the climate for doing business is not very favorable for start-ups and also for foreign companies. It is however thought that large and powerful firms would be in a better position to overcome the obvious obstacles and pave the way for SMEs to do business. The progress which can be achieved by a consequent introduction of modern management principles will be illustrated at the example of three food related cases and one case where tutoring at the grassroots resulted in very promising business activities. The examples should illustrate the problems and potentials which are related with the introduction of technical improvements and how targeted educational measures can initiate and promote positive developments. It should be mentioned at this point that there are many other examples of technical support to mention in this context are the efforts of General Mills in East Africa, Cargills educational programs in Ivory Coast and Nestlé’s engagements.

Case 1: The Kilombero Sugar Company (KSCL): Kilombero Sugar Company: Growing sustainable business in Tanzania

The Kilombero Sugar Company was fallen in disrepair as a government owned company. In 1998 the company was privatized, presently it is owned by South African and UK-based companies (75%) and the Tanzanian Government. A major problem for the new management was that the raw material supply by local SME’s was in extremely poor conditions. In detail the out-growers suffered from:

- Poor land/soil stewardship which resulted in extremely low yields per hectare.
- Poor farm infrastructure,
- 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 base (soil cultivation, cane growing, harvesting technologies), seed material, irrigation methods, etc.
• Poor health services, education, clean water, safe food.

Since the prosperous development of the company was based and relied on a positive development of the out-growers, the company took an active role in improving the situation of the out-growers and the area at large. The company
• Set up a system to communicate with cane farmers
• Established a system of fair and reliable payments
• Invested in the reconstruction of the infrastructure
• Supported educational measures including construction of schools, construction of housing, hospitals, clean water supply systems, etc.

It was expected that through this measures a sustainable industry and poverty alleviation could be achieved in detail it was hoped that,
• The number of farms could be increased and SME in the food industry sector and general industrial sector could be created, with up to 3000 farm jobs on farms and in SME,
• Increased agricultural yields and more profit per hectar could be obtained,
• The rural communities in the area would become self-sufficient,
• Investors for other production areas would be attracted.

In more general terms it was expected that the Kilombero Sugar Company Project
• Would encourage the communities involved to maximize their available opportunities,
• Would assist in developing a stronger community sense,
• Increase the business and technical skills,
• Assist in developing SMEs
• Create sustainable wealth within the community.

In order raise the general interest of the cane farmers in doing business at large and change the mindset the profit making issue of cane growing was stressed. Incentives for the farmers were:
• Better access to new technologies, management support, business information,
• Better access to financial loans,
• Better access to training measures on soil and plant management, harvesting methods, general manual skills,
• Formation of cooperatives.

The improvements of the situation were already visible after the first two years after the implementation of the various measures, the number of out-grower farmers were almost doubled and the production output increased by 43%. The present time production of cane amounts to 245 000 ton, the potential of the area is around 600 000 ton.

As collateral effects it was recognized by the KSCL,
• That their economic wellbeing is closely linked with the development of the farmer’s community and the development of the local infrastructure.
• That their core business is making sugar but that it is important for the development of company and community that other types of food industry, possibly related to the sugar production, should be established in the area to broaden the industrial base and intellectual potentials. In order to comply with this expectations external knowledge on food processing in general has to be sought.
Case 2: Tanzania Brewers

Like KSCL, Tanzania Brewers was a government owned company which struggled under a couple of problems typical for the area. Most of the production facilities were in poor conditions, raw material supply was not sufficient with regard to quality and quantity. In order to maintain its production 98% of raw materials had to be imported including bottles. After privatization (present owner SABMiller) it was decided to turn to local production in order to become independent from imported materials and rising world market prices and as a collateral effect strengthen local economy. The management decided that all produce and products required for their beer production would be sourced locally,

- Malt,
- Bottles,
- Labels
- Corks, caps and
- General supplies.

The glass bottle manufacturer used to produce bottles of substandard quality. The company was guaranteed that all bottles required by the brewery would be bought from them in case the quality of bottles would satisfy the need of the brewery. On the basis of this contract the glass manufacturer could improve its facilities and also expand its output it is now the leading glass manufacturer in Africa and supplies also bottles for Pepsi and Coca Cola.

Similar arrangements were made with all suppliers. The printer of the labels could also expand its business beyond its relation with Tanzania Brewers.

The Barley production was considerably improved by encouraging private farmers to cultivate barley on land which was owned by the brewery. The farmers were trained and supported by the brewery to obtain high quality and high quantity yields.

Interesting in these endeavors are the brewery’s efforts to adapt and introduce new food technologies e.g. water-saving measures. An efficient brewery will typically use between 3.5/4 and 6 liters of water to produce one liter of beer. Some breweries use much more water, especially small breweries. The company aims to use maximal 4.5 litres of water to brew a litre of beer. Besides a special electronic energy and water management system, a campaign has been launched to raise the employees awareness regarding the problem the campaign includes a specially designed comic to bring the message of water-saving to to all workers and involve the workforce in both water and energy awareness.

Case 3: The Unilever Novella Project (Allanblackia Project)

Unilever, was interested to integrate in its raw material portfolio a produce which would help to promote biodiversity, sustainability and poverty alleviation in Eastern Africa especially in Tanzania. Suited for the project was the Allanblackia nut (AB), AB oil is presently used locally for frying. It was understood that AB could have a much wider application than for occasional frying of local African foods. AB has a favorable fatty acid composition, the oil has rather high melting point which makes it suited for margarine and spreads. So far the nut was not used commercially; the prospective is that in case a stable and sustainable market situation can be created, the return on Allanblackia planting is greater per acre than for cocoa or oil palm.
The Allanblackia tree grows in parts of West, Central and East Africa primarily in tropical rainforests, it can also be found on cultivated farmland amongst others in Tanzania. For the commercial use of AB a complete supply chain had to be set up. This operation was organized in Tanzania with the support of several national and international agencies.

In detail the AB supply chain did comprise five steps:
- Cultivating,
- Collecting, stabilizing
- Transporting,
- Processing (crushing and oil recovering as completely new technique for the personnel involved), and
- Exporting.

To deal with the agricultural challenges as there are,
- Cultivation of AB,
- Harvesting (collecting) and
- Nut stabilization by drying,

The crop farmers were trained by NGOs with the support of the Tanzania AB-Board to obtain higher yields. Infrastructure improvements were supported by national and international Development Programs core activities were the installation of adequate transportation systems. For efficient drying and crushing of nuts and oil recovery new and technologies partially unfamiliar to the local workers had to be introduced.

In order to assist in the utilization of the produce Unilever has formed an independent company which oversees the further commercializing steps
- Transport to collecting centers,
- Seed crushing and oil recovery, furthermore
- Transport of oil to Europe

The company also provides help to the farmers and assures prompt payments to the farmers.

At the present time the expectations for the project are rather positive with regard to production sustainability. It is clear that the production has to be increased much above the present level which will only be possible by a systematic cultivation of the AB trees also a high product quality has to be achieved and maintained. To balance local crop failure like the ones in 2006/7 because of a severe draught in Tanzania, it will be important that also in other geographical areas Allanblackia will be intensively cultivated e.g. Ghana, Cameroon and Nigeria, and that possibly more high yield varieties will be introduced. Furthermore supporting measures to ensure quality production like training of farmers and processors, improvement of infrastructure etc. have to be put in place.

Results of the Allanblackia Project to date are highly encouraging:

 Around 10,500 farmers have been mobilized and trained to collect and plant new trees (100,000 planted to date). More than half of these farmers are women. In 2010 over 300,000 trees will be planted and Unilever will purchase over 200 tons of oil.

The average AB earning per farmer per year has increased from $ 30 to ~$ 100. Forty-five full-time jobs managing the buying centers, half of which are held by women, have been created.

650 tons of AB seeds are produced per year and future demand stands at 600,000 tons.

The planting of AB trees will lead to a marked increase in supply volumes, thereby increasing the impact on rural income levels. By 2016, more than 25,000 farmers should
be able to earn more than $200 per year farming AB, in addition to their other economic activities. The project also demonstrates positive environmental impact by bringing value to non-timber forest products through the use of the indigenous AB tree.

The development of the project was rather complicated mainly because of bureaucratic hurdles mainly on the level of local governments which could be overcome only by strong partners like Unilever, Tanzanian Government, and UN Agencies.

Case 4 Tanzanian Women Entrepreneurs, Spearheading Development in the Food Industry

In 1993 an integrated Training Program for Women Entrepreneurs in the Food Processing Industry was designed by Tanzania’s Small Industries Development Organization of Tanzania and UNIDO. In the following years 360 women were trained, 240 of them started a Micro/Small-Enterprise, 320 new jobs were created and new products were brought on the market. The program focused on women from all parts of Tanzania which were interested in entrepreneurial operations and who had already some experiences in small scale food production, who lacked however technical and entrepreneurial skills. The program comprised three month standard training courses as well as refresher courses. The courses were presented by persons with experiences in training entrepreneurs, business development or food technology. As instruction materials manuals in Swahili were used. In detail the manuals addressed besides entrepreneurial awareness, technology and management skills mainly food technology related subjects like processing of fruits and vegetables, extraction of edible oil, the manufacture of cheese, butter, bakery products, sausages and fruit wines cleaner production, waste management and environmental issues. Furthermore knowledge on building up self-confidence, negotiation and marketing techniques and other more socially relevant subjects were imparted. An important method of instruction was learning by doing were the trainers acted as facilitators. The best performing entrepreneurs produced in one year goods worth US$ 45 000 they marketed wine, jam, mango-pickle, tomato sauce, cakes, bread and other bakery products, weaning flour. The income per capita of the entrepreneurs was US $ 240 per annum.

Most of the women entrepreneurs have after care marketing efforts specialized on new products typical for an area or new market trends

- Nutritious flour / weaning food
- Peanut butter
- Fruits in syrups, vegetable pickles
- Fruit, tomato, gooseberry jam
- Honey
- Garlic paste

In order to develop a sustainable basis for the community of Micro- and Small-Enterprises (MSE) the women have founded the private Tanzania Food Processing Association (TAFOPA). With the support of the national governmental and international organizations (national and international Aid Agencies e.g. UNIDO, USAID, DIFD, GTZ) TAFOPA is committed to strengthen and expand the existing network. TAFOPA endeavors to improve the entrepreneurial climate with regard to the legal and financial situation, it aims

- 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
• to identify production constraints and solutions for improved processing

Of central concern is the provision of
• technical assistance and training in quality assurance
• consulting in use of new technologies and possibly in the introduction of new technologies
• instructions on clean production and hygiene, packaging, energy saving, effluent handling
• measures to upgrade processing lines and develop new products to meet market demands and remain competitive

For MSE women already trained and those interested to become entrepreneur, qualified trainers have to be recruited with the support of national and international NGO mainly from the field of Food Science and Technology or from established enterprises. The aim is to strengthen the technical diffusion component, to present technical refresher and topic-specific training courses as well as managerial courses.

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

First of all there is definitely a need to increase and stabilize the agricultural production DC in a sustainable way. In the case of Tanzania the expansion of the agricultural production is certainly of high relevance. In detail it will be important

• Increasing the land area under cultivation
• Increasing the productivity per area
• Introduction of improved (GM) plant materials and
• Reducing the losses

The production aspect is however 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 in other words it is the task of the Food Science community to valorize agricultural produce in a sustainable, environmental way for the benefit of producers and consumers.

Important steps to improve the situation in Tanzania with Food Science related measures are the reduction of post harvest losses; highly important is however the sustainable development of a largely autonomous food industry. A healthy and well based system MSE is certainly a good precondition of a solid evolution. Maize, rice, potatoes, bananas, cassava, beans, vegetables, sugar, wheat, sorghum, millet and pulses, as well as tea, cotton, coffee, pyrethrum sugar cane, sisal, horticultural crops, oil-crops, cloves, tobacco, coconut and cashew nuts are the basis for an growing food industry. Suited for further production steps and industrial processing are also livestock like cattle, sheep, and goats, mainly for meat and milk production; pigs and poultry for white meat and eggs hides and skins respectively.

**Reduction of Post-harvest losses and subsequent processing**

Post-harvest losses can be attributed to a large variety of factors and reasons. Even in situations with well established production lines it would helpful to reconsider the production range and enter into some strategic considerations.
• Analysis of marketing potentials
• Production potentials i.e. climate and weather,
• Soil fertility, irrigation potentials,
• Availability of fertilisers and pesticides,
• Production skills, transport etc.

In addition, in case new or modified plant materials are used or introduced a good understanding/familiarity of/with the physiology of the plant materials and their requirements regarding
  o Growing
  o Fruit Formation
  o Blossoming
  o Harvesting
are a prerequisite.

Further requirements for consequent post-harvest processing and an optimal utilization of agricultural produce through even a small food industry concern amongst others the Infrastructure, the Technical Background and most important the Human Factor.

  • Infrastructure
    • a transportation network fit to handle all incoming and outgoing materials i.e. streets or rail road systems
    • an energy supply network fit to respond to all energy requirements i.e. electrical energy, thermal energy
    • A water network fit to handle the clean water supply and the waste water management

  • Technical Background
    • mechanical workshops to handle repairs and
    • construction of smaller processing units
    • storage facilities to store incoming unprocessed and outgoing processed products
    • analytical facilities to survey and control quality of incoming unprocessed

  • Most important for processing raw material after harvesting is the Human Factor:
    • a workforce fit to handle all challenges connected with processing
    • an educated and well trained workforce, educated and trained in.....
      o handling a multitude of technical,
      o commercial and
      o strategic tasks.

The benefits of a consequent post harvest processing that may result in a subsequent processing of the agricultural produce close to the place of origin of the production are by no means restricted to the utilization of the agricultural production.

  • Food processing units in rural areas...
    • create employment,
    • challenge the educational system
• prevent migration into urban centres
• help to reduce poverty
• stabilizes social systems
• improves the abilities to handle
• complex systems.

• On the consumer site: Processed Food
• secure food safety,
• reduce the costs for food,
• reduce the time to be spend for preparing meals,
• especially of interest for women because it frees up time for wage work and other beneficial activities.

In case new Post-harvest Processing Technologies/New Processing Technologies or Equipment are being introduced to rural areas again certain requirements have to be met

• the Technologies and/or the Equipment should be...
  • easy to understand /handle – foolproof –
  • easy to maintain
  • low energy requirements / operation costs
  • possibly be rooted in local/traditional technology
  • possibly be the step stone for more advanced technology

Processing steps following first post harvest measure should
• upgrade and valorize the agricultural output with minimum processing losses
• include waste utilization and other measures
• secure and improve food supply
• contribute to sustainability of the agricultural production

In this context it has to be recognized that diminishing losses and optimize the utilization of agricultural produce is more sustainable than an increase in production to compensate for the losses.

Possible practical Post Harvest/Processing measures in Tanzania and other EAC countries are the production of traditional and newly developed
• juices, nectars and wines
• fermented/pickled fruits and vegetables
• canned fruits and vegetable
• dried fruits and vegetables
• CA-treatment of fresh fruits and vegetables
• flour preparations, bread and other bakery products
• potato/cassava products e.g. crisps
• fresh and fermented milk products and,
• peanut butter

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:
• Exploration of suitable sites;
• the Educational Thrust;
• the Training Thrust and
• the Technology Transfer Thrust.

As the case studies have demonstrated, it will be rather difficult to implement the described measures. Major hurdles beside bureaucratic obstacles are the lack of a basic technical understanding and the widespread illiteracy. As mentioned above (Tanzania Brewery) completely new approaches have to be put in place e.g. using comic type instruction materials. Further the fragmented structure of the industry with an extremely high number of informal industrial units which are difficult to approach present obstacles which have to be mastered.

In an alpha-test the IUFoST's distant-educational approach, which consist of various Distant Education Modules was successfully tested. The Training Thrust part is directed towards female entrepreneurs, mainly from small-hold farms and small private companies. According to the underlying concept IUFoST will select mentors which have basic training in Food Technology; students entering this stage of training should not live not too far away from mentor’s home location that means that especially sites will be selected with educational institutions nearby. The goal of the technology transfer measures is to place adapted modern technologies in the hands of trained and experienced groups and individuals. Under optimal conditions pilot-scale processing units should be part of the instruction, the selected and adapted pilot-scale processes should foster linkages between farmers and food industries e.g. to create contract growing of crops which would benefit both parties. Technologies selected for first transfer measures are Drying, Thermal Processing at large, Chilling and Freezing and CA-Storage.

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