

Promoting Appropriate Technology for Sustainable Development: Case of Agro-processing SMEs in Tanzania

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Abstract— The present status of agro-processing SMEs in Tanzania is largely informal, under-performing and in need of considerable assistance to overcome barriers to its growth. Agro-processing SMEs use labour-intensive technologies to compensate for the lack of technical capacity in order to perform well. The strength of the Tanzanian agricultural sector lies in the ability of the farmers to produce high quality produce and products. This will only be possible through the use of appropriate technology right from the farming stage through processing to marketing. The transformation process of changing raw agricultural material to consumable value added product must require the use of appropriate technology in one form or another. In fact technology are the key to improving efficiency in agro processing and value addition industry to compete against imported produce from countries with developed industry. This paper focuses on how to promote appropriate technology and overcome barriers for sustainable development and growth of agro-processing SMEs in Tanzania. The discussion of the findings is based on the data collected from questionnaires and interviews which was administered to 120 Small-scale Agro-processing Enterprises in nine regions of Tanzania.

Index Terms—Agro processing, appropriate technology, SMEs

I. INTRODUCTION

Agriculture is the cornerstone of most developing countries' economies. Unfortunately, agriculture alone is no longer able to provide a reliable livelihood for the growing populations in these countries. Alternative or additional income generating opportunities are needed to support the millions of poor families who can no longer support their livelihoods from the land alone.

However, agriculture continues to play a leading role in Tanzania's economy. Agriculture includes crops, livestock and hunting sub-sectors. As it was the case in at least past decade, the contribution of agriculture sector has also decreased in 2007(URT, 2008). Agriculture economic activities contributed 25.4% to GDP in 2006, and it dropped to 24.6% in 2007. This fact is elucidating by, among other

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factors, the increasing importance of other sectors such as manufacturing, mining and financial services. Agriculture sector accounts for approximately 80% of total employment (URT, 2008). However, unreliable rains, poor roads and insufficient market access reduce the ability of farmers to provide themselves with adequate livelihood. As a result many people migrate to towns and cities, often to live in poorly serviced settlements and engage in the informal economy.

One of the objectives of the Tanzania Development Vision 2025 is to transform the country's predominantly low productivity of the agricultural economy to a semi-industrialized economy led by modernized and highly productive agricultural activities, which are reinforced by supportive industry and services (URT, 1999). One of the major corrective measures required due to the current global competition, the government, industry and R&D institutions need to work together so as to ensure technologies developed by R&D institutions reach agro-processing SMEs so as to promote technological innovation and enhance enterprise growth in the country. However, Tanzania still needs extra effort in its progress towards achieving the Millennium Development Goals (MDGs) whose target is halving poverty and ensuring food security by 2015. As increased agricultural production is envisaged, there is a need to have proportionate improvement in the agro-processing industry. One of the challenges facing the sector is lack of modern and appropriate technology in farming and processing.

II. IMPORTANCE OF AGRO-PROCESSING SMEs TO TANZANIAN ECONOMY

UNIDO (2005) proposed that SMEs are the key to the transition from agriculture-led to industrial economies as they provide simple opportunities for value-adding processing activities which can generate sustainable livelihoods, and are a seedbed for entrepreneurship development, innovation and risk-taking behaviour and provide the foundation for long-term growth dynamics and the transition towards larger enterprises. Katalambula *et al* (2006) urges that the majority of Tanzania's population is estimated to be making their living on subsistence agriculture and SMEs activities, and that SMEs contribute about 35% to GDP and 20 % of the total labour force. Olomi (2006) urge that SMEs have greater economic benefits than large firms in terms of employment generation, efficiency, and growth since they use more of what a country possesses and less of what it lacks. Unlike large-scale enterprises, which are often capital intensive and which use mostly imported inputs and spare parts, SMEs mostly use locally available resources.

However, Tanzania's agro-processing industry processes only about 1% of the available raw materials (Mukani, 2003; Silayo, 2005). This compares very poorly with 40-50% in

Thailand, 78% in Philippines, and 38% in Malaysia, which fall under the category of developing countries (TNBC, 2009). It is further estimated that fruits and vegetables ranging from about 40-60% is wasted due to the number of factors including lack of appropriate processing facilities and poor transport network.

Processing methods in Tanzania vary from the very traditional to modern ones. Most of the products meant for local consumption are processed by using simple traditional methods. For the exportable products, where strict quality standards have to be observed, modern processing methods are employed. Processing of agriculture products is viewed as one means of reducing post-harvest losses, generating income of both farmers and processors through sales and enhancing food and nutrition security, however, that successful agro-processing business must observe and comply with a number of issues such as properly constructed premises to meet certain criteria and proper procedures for producing a quality product as per *Tanzania Food, Drugs and Cosmetics Act, 2003*. However, a large amount of agro-processing processing activities in Tanzania is still being carried on in the unorganized sector which includes household and non-household establishments.

The potential for agro-processing SMEs development in Tanzania is largely linked to the relative abundance of agricultural raw materials and low-cost labour in most of them. The most suitable industries in such conditions are indeed those that make relatively intensive use of these abundant raw materials and unskilled labour and relatively less intensive use of presumably scarce capital and skilled labour.

III. APPROPRIATE TECHNOLOGY FOR AGRO-PROCESSING SMEs

Appropriate technology is small-scale technology. It is simple enough that people can manage it directly and on a local level (Helweg and Smith, 1978), it is affordable, it helps protect the environment, it meets people's needs, it uses local skills and materials. Worgan (1977) points out that appropriate technology makes use of skills and technology that are available in a local community to supply basic human needs, such as gas and electricity, water, food, and waste disposal. Thus, appropriate technology makes it possible to satisfy our basic human needs while minimizing our impact on the environment.

However, Chungu and Mandara (1994) urge that any technology is appropriate at the time and place of original application. Schumacher (1973) emphasizes that technology appropriateness can be assessed only through learning local culture and working with and through local people. Therefore, appropriate agro-processing technologies imply affordable, locally produced and locally repaired, reliable technology that has a suitable size and complexity of operation for the people who will operate it.

IV. METHODOLOGY

Data collection was done from April 2009 to February 2010. The instruments chosen to fulfill this requirement included structured interviews using questionnaires comprising both Likert scale and open-ended questions and in-depth interviews as both quantitative and qualitative information were required. Science in quantitative approaches is

associated with objective truth, while qualitative research tends to focus on subjective experience (Neuman, 1997; Newman and Benz, 1998). As many secondary data sources related to the subject areas covered by this study as possible also were used, including books, theses, journals, and electronic sources information.

The structured survey was employed and involved several steps from designing the questions to field work and assessing the reliability of the measurement used. The survey was designed to obtain information on how appropriate technologies can be promoted and overcome barriers to sustainable development and growth of agro-processing SMEs in Tanzania. Observations were also used as a supplement to drawing conclusion.

The sample selected was 120 and usable sample was 104 agro-product processing SMEs in Dar-es-Salaam, Morogoro, Arusha, Tanga, Coast, Iringa, Mbeya, Kilimanjaro and Mwanza region. This shows the questionnaire return rate of about 95%. These regions were selected because they are among the major industrial regions in Tanzania (NBS, 2009; URT, 2003).

V. DATA ANALYSIS

The data were analysed using the Statistical Product and Service Solution (SPSS) package formally known as Statistical Package for Social Sciences. Data collected were analysed by using trends and patterns. From the analysis of the results all graphs and charts were created in Microsoft Excel. Histograms of the data collected were used to present graphical representation and comparison of some of the basic data.

VI. PRESENTATION AND DISCUSSION OF FINDINGS

Growth of the agro-processing SMEs in Tanzania is hampered by various constraints that range from limited access to modern and appropriate technology to unfriendly legal requirements. The observed constraints include:

6.1 Limited access to modern and appropriate technology

Most of the interviewed processors carried out their processing activities in their home kitchens. About 64% of the enterprises visited revealed that lack of modern and appropriate processing equipment seriously or very seriously affected their business while 26% were moderately or strongly affected as shown in Figure 1. Where they used machinery, about 66% of respondents were dissatisfied or very dissatisfied with acquired technologies as shown in Figure 2. Only about 14% were satisfied or very satisfied with the technologies they were using.

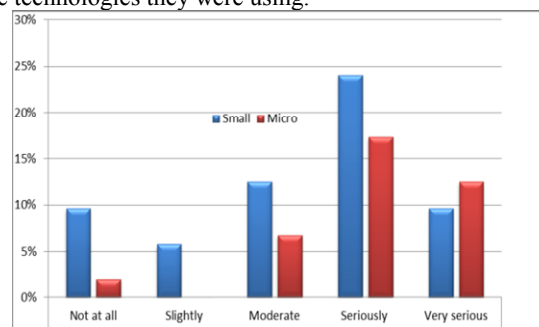


Figure 1 Lack of modern and appropriate processing equipment

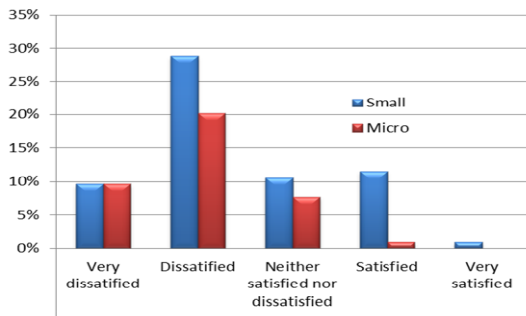


Figure 2 Technology satisfaction

6.2 Lack of access to technology information

Lack of access to proper information ranged from slightly to very serious to the majority (about 88%) agro-processing SMEs. While there are many actors emitting ‘signals’ about technology and about support opportunities, it was revealed from this study that only 12% of responding SMEs were good receptors of this information as shown in Figure 3. Agro-processing SMEs tend to be relatively shaky economically and therefore focus on short-term problems rather than long term improvement opportunities based on technology information.

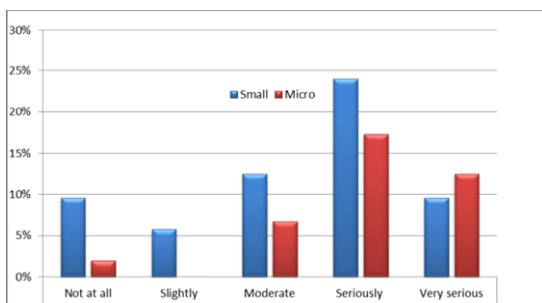


Figure 3 Lack of access to proper technology information

6.3 Lack of access to finance

It was observed that most agro-processing SMEs had problems with long-term investment finance. The study indicated that 64% of agro-processing SMEs found it seriously or very seriously difficult to secure loans from financial institutions because they lacked proper financial records from which assessment could be made to demonstrate their viability to lending institutions as shown in Figure 4. The survey showed that some of the recent government initiatives had not caught the awareness of some of the interviewed agro-processing enterprises.

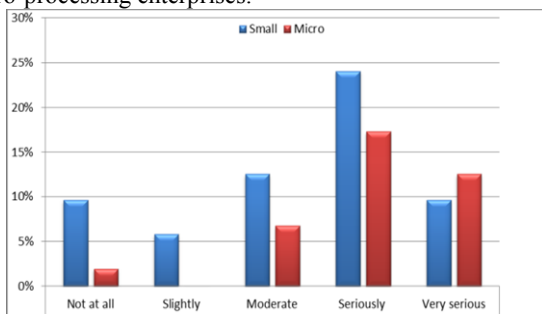


Figure 4 Difficulty to access credits/loans from financial institutions

6.4 Lack of production premises

It was revealed from this study that about 74% of the visited agro-processing SMEs ranging from moderately to very seriously lacked properly built and certified production premises that meet the minimum required health standards for legal recognition as shown in Figure 5. This means that most respondents were unable to acquire the certification and standard mark provided by the Tanzania Bureau of Standard (TBS) for their processed products. In addition, lack of economic infrastructure such as sustainable power, water supply and sanitation and transportation systems (e.g. roads, railways and ports) seriously constrain agro-processing SMEs in Tanzania. It was revealed further from this study that successful agro-processing business must observe and comply with a number of issues such as properly constructed premises to meet certain criteria and proper procedures for producing a quality product as per Tanzania Food, Drugs and Cosmetics Act, 2003 (URT, 2003).

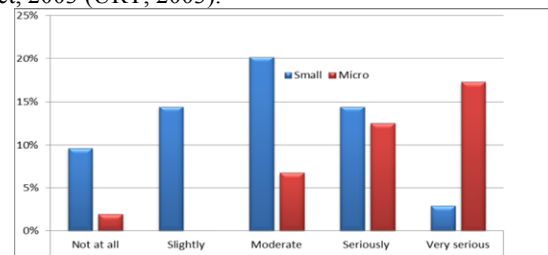


Figure 5 Lack of appropriate processing premises

6.5 Poor marketing and entrepreneurship skills

It was revealed from this study that lack of adequately trained manpower for marketing and entrepreneurship was a serious problem in several SMEs. It was observed that limited access to formal business training made it difficult for most of entrepreneurs to obtain the required skills. About 34% of respondents indicated that access to formal business training was poor, 36% reported moderately accessing formal training while about 27% and 3% declared to have good and very good access to training as shown in Figure 6. Further, it was observed that most of workers were self-trained artisans whose skills were normally low and as a result their productivity was poor, and workmanship was irregular and unreliable.

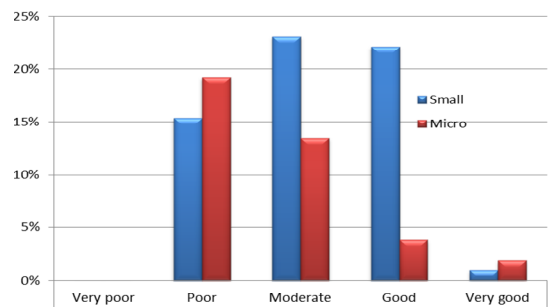


Figure 6 Marketing and entrepreneurship skills

6.6 Lack of appropriate packaging materials

Lack of adequate access to appropriate packaging materials for processed products was identified as a major constraint especially for those SMEs with a market focus. In order to compete successfully, the agro-processing SMEs need high quality packaging that meets national and international

standards and guarantees optimum product performance, in terms of protection, preservation and appeal. It was observed that about 80% of respondents, ranging from moderately to very seriously, lacked appropriate packaging to protect the processed goods during handling and transporting to the markets as shown in Figure 7. This makes the processed products to look inferior and unable to compete with imported products which continue to flood the market, or large industries which can afford to invest in imported expensive and better packaging materials.

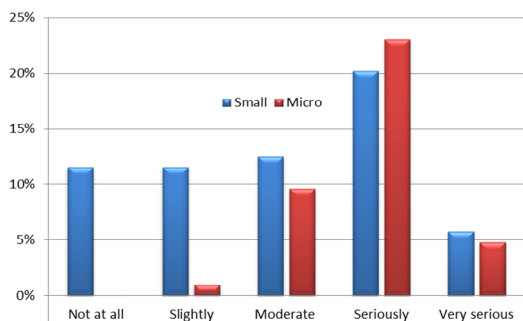


Figure 7 Lack of appropriate packaging materials

6.7 Unfriendly legal requirements

Agro-processors reported some legal constraints associated with bureaucracy in registration of businesses as indicated by about 10% of the respondents, high tax rates about 67% and land ownership about 23% as shown in Figure 8.

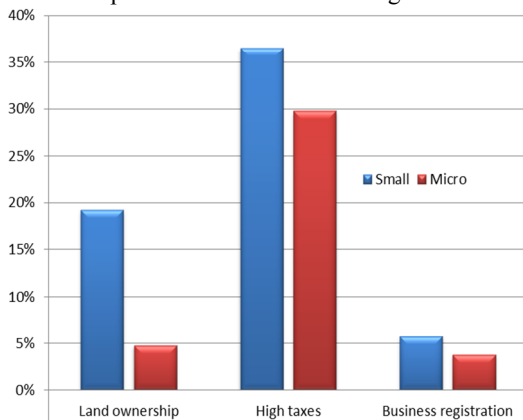


Figure 8 Major legal constraints to agro-processing SMEs

CONCLUSION

It can thus be concluded that the potential of the agro-processing sector in Tanzania has not been fully exploited due to a number of barriers that hinder the development of the sector. These barriers include lack of modern processing equipment that could help improve efficiency. Where they used machinery, the equipment were often old and needed replacement or were often out of order for lack of spare parts. It is worsened by lack of proper maintenance which is an important reason for breakdowns. Some of agro-processors are heavily dependent on the imported technology and they remain always dependent on imported skills for the maintenance and operation of plant.

Therefore, the success of this sector will in future depend largely upon the degree of which the country can promote, consolidate and strengthen agro-processing technology development activities. This will help to accelerate the speed for industrialization and therefore increase its capability to solve basic industrial problems without relying on technological assistance from outside.

It is important to promote establishment of mobile processing units for farm gate processing. This could contribute to rural employment, reducing losses, reducing rural-urban migration, reducing the need for transport of fresh perishable commodities and increase stability of the products. Agro-processing SMEs or individuals in the country require training in business management so as to be able to run their business in a competitive way apart from being trained in a given technology. Thus, for the above to happen, SMEs need assistance in acquiring the said knowledge from the Government or from donors as they cannot afford to foot the training bills on their own.

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