Challenges and opportunities of Tanzanian equipment manufacturing SMEs in performing sound technological innovation

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Abstract
In Tanzania, the SME sector is the emerging private sector and a base for sector lead growth. This sector mobilizes scarce resources, requires less capital investment and shorter gestation periods, provide employment to a large number of people for a given cost and caters the needs of fragmented domestic market in Tanzania economy. Though the sector possesses the highest employment potential in Tanzania, the sector is largely informal, under-performing and in need of considerable assistance to overcome the entrenched disadvantages and barriers. The general problems of the SME sector, apart from capacity-building in technology as reflected in various studies, highlight the inadequacy of SMEs in legislation, insufficient skilled workers, and various support services – financial, legal, and marketing. However, this sector suffers a number of challenges in domestic and global market competition, though, varieties of opportunities in performing sound technological innovation are in place. This paper focuses on what challenges and opportunities have Tanzanian equipment manufacturing SMEs in performing sound technological innovation. The discussion of the findings is based on the data collected from questionnaires and interviews which was administered to 30 small-scale equipment manufacturing enterprises in nine regions of Tanzania.

Key words: technological innovation, equipment manufacturing, SMEs.

1. Overview of Small and Medium Enterprises (SMEs) in Tanzania

SMEs have become an important source of income and employment to the overwhelming majority of Tanzanians. It is estimated that approximately 50% of the industrial output originates from SMEs [1]. SMEs account for a large share of enterprises active in Tanzania, which actually form the base for private sector-led growth. They are in a way, the sub-sector that contributes most to job creation, they are the major suppliers of goods and services to the society; major creators of new products, new services and save as a training ground for new entrepreneurs, [2]. Several studies confirm that a nation’s growth and sustenance is dictated, to a large extent, by the performance of small businesses. However, the reality is that SMEs are constantly struggling to survive and maintain their schedule of activities [3].

These problems include difficulties in accessing credit, lack sufficient markets for their products, use of outdated technology, lack of adequate working place, cumbersome official procedures in setting up, operating, and sustaining a business, poor infrastructure, inadequate financial support framework and lack of effective institutional structures [4]-[1]. Even more pertinent is the lack of access to crucially needed venture capital for the creation of new SMEs and the continuance of existing operations. With interest rates on loans being quite high, and repayment periods relatively very short, SMEs cannot be expected to flourish.

In most cases an SME is defined according to number of employees, sales turnover or capital. This research adopts definition of SME as postulated by the SME Development Policy of Tanzania using the size criterion depending on the number of employees and the capital invested, as illustrated in Table 1.

Table 1 Classification of Enterprises

<table>
<thead>
<tr>
<th>Category</th>
<th>Employees</th>
<th>Capital Invested in Machinery (Tshs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro enterprise</td>
<td>1 – 4</td>
<td>Up to 5 mil.</td>
</tr>
<tr>
<td>Small enterprise</td>
<td>5 – 49</td>
<td>Above 5 mil. to 200 mil.</td>
</tr>
<tr>
<td>Medium enterprise</td>
<td>50 – 99</td>
<td>Above 200 mil. to 800 mil.</td>
</tr>
<tr>
<td>Large enterprise</td>
<td>100 and above</td>
<td>Above 800 mil</td>
</tr>
</tbody>
</table>

Currently, the progress of SMEs is hampered by weak infrastructure, insufficiency of electric power, and high costs of energy, water, and industrial space [5]. The other drawbacks, such as accessing credit, lack sufficient markets for their products, use of outdated technology, lack of adequate and reliable working place, cumbersome official procedures in setting up, operating, and sustaining a business, add to their burgeoning problems. The other drawbacks, such as the inability of SMEs to keep pace with the rapid development in global finance and economy, and the inadequacy of their management and organizational practice, add to their burgeoning problems [6].

Thus, the full potential of the SMEs sector has also yet to be tapped due to the existence of a number of constraints hampering the development of the sector as already pointed out above. As a result many firms stay small and informal using simple technology. It is, therefore, inevitable that a large majority of micro and small firms in Tanzania have focused on traditional industries where the activities are mostly characterized by low technological complexity and extensive use of unqualified labour.

Given SMEs’ lack of access to external finance, their decisions to upgrade their equipment and machinery by making new investments are further constrained by limited internal sources of financing. Despite those size disadvantages [7], [8] and [5] argue 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.

Because of the SMEs’ limited resources and relative inability to absorb the costs and risks associated with in-house technological innovation, they must often utilize the process of technology transfer to take advantage of the benefits gained by technology and innovation. In view of the fact that SMEs have the potential to contribute positively to a country’s economic development and that their ability to innovate has an impact on their capacity for survival in the long run, it is important to identify the primary obstacles they face with regard to new technology development and innovation and to create tools and policies designed to help them meet these specific challenges [9].

2. Innovation concept

Reference [10] defines an innovation as ‘an idea, practice, or object that is perceived as new by an individual or other unit of adoption’. According to [11] innovation is an on-going process of learning, searching and exploring, which result in new products, new techniques, new forms of organization and new markets. Reference [12] noted that a true innovation can take the form of a new product, new technology, new process, new content, or even the new presentation (e.g. packaging) and marketing of an existing product or service. The common criterion in any definition of innovation is newness.

Therefore innovation is more than the generation of creative ideas, it is the implementation of those ideas into some new product, process or service, organizational or marketing method and it requires combination of those ideas with resources and expertise that make it possible to embody the creative idea in a useful form. The increasing importance of innovation has been driven largely by the globalization of markets and the advent of advanced technologies that enable more rapid product design and allow shorter production runs to be economically feasible.

3. Technological innovation, a major force in economic growth

Technological Innovation is a dynamic and complex process of converting a research results into a production enterprise leading to a positive technology change. This complex process involves technological information, technological capability, market demand and argent to transform this capability into goods and services to satisfy market demand. Reference [13] describes technological innovation as the act of introducing a new device, method, or material for application to commercial or practical objectives. While [14] further point out that technological innovation comprises new products and processes and considerable technological change of products and processes, and described the two types of technological innovation namely:

a) Technological product innovation, which involves introduction of new or improved product; and
b) Technological process innovation, which involves the adoption of new or improved production method.

Reference [12] revealed that most of the innovations in the developing countries are incremental in nature, and there is hardly any fundamental innovation in Tanzania;
what is presented as innovation is the copying of technologies and manufacturing those using local materials. He further mentioned challenges, which hinder the innovativeness of the engineering enterprises as low level of education among the entrepreneurs; lack of financing; lack of linkages with R&D institutions; lack of innovative culture and poor market for Tanzanian products. He observed that with increased competition in the world for new products and better services, innovation becomes crucial for sustainable development of a country. However, Tanzania in 2002 proclaimed SME Policy that could stimulate development of SMEs. One of the SME policy priorities is to facilitate the acquisition and adaptation of technologies as well as to enhance relevant linkages in a bid to upgrade technology so as to raise their productivity and competitiveness in their products [2].

Furthermore [15] pointed out three factors for the success of technological innovation:

a) Science and Technological capability,

b) Market Demand, and

c) An agent to transform this capability into goods and services to satisfy the demand i.e. an entrepreneur.

Thus, the impact of a technological innovation will generally depend not only on its inventors, but also on the creativity of the eventual users of the new technology.

4. 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 [16] and [17]. 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 what challenges and opportunities have Tanzanian equipment manufacturing SMEs in performing sound technological innovation. Observations were also used as a supplement to drawing conclusion.

The sample selected was 30 and usable sample was 28 equipment manufacturing SMEs in Dar-es-Salaam, Morogoro, Arusha, Tanga, Coast, Iringa, Mbeya, Kilimanjaro and Mwanza region. This shows the questionnaire return rate of about 93%. These regions were selected because they are among the major industrial regions in Tanzania [2] and [18].

5. 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.

6. 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 constrains include:

6.1. Responding equipment manufacturing SMEs

Twenty eight (28) SMEs out of 30 sampled SMEs responded to the questionnaire, which was a return rate of 93%. There was also a need of getting the right information from the interviewees; therefore emphasis was put on interviewing people who were well informed about a particular business. Figure 1 show that about 78.6% of those interviewed were the business owners, hence suggesting that the information collected was quite accurate and reliable.

![Interviewee position in equipment manufacturing SMEs](image)

6.2. Equipment manufacturing SMEs ownership

The study observed that the ownership of most of businesses was sole proprietorship, accounting about 64% respondents, followed by small industries.

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development organization (SIDO) 14%, partnership about 11% and government ownership 7%. The group ownership was only 4% as shown in Figure 2.

6.3. Equipment manufacturing SMEs performance satisfaction

Most of the respondents (a total of about 62%) were dissatisfied or very dissatisfied with the way their enterprises were running as shown in Figure 3. Main reasons given for this were obsolete technology that was being used (36% of respondents) and lack of technological assistance (29%) as shown in Figure 4. Other reasons included frequent breakdowns of machines and poor management.

6.4. Business start-up funding

Newly started equipment manufacturing SMEs face the additional problem of lacking a track record. As a result many firms stay small and informal using simple technology. Their smallness also protects them from legal proceedings; hence in many cases entrepreneurs are unable to contribute sufficient capital for their business. Their main sources of capital are their retained earnings, informal savings and loan associations, which are unpredictable, not very secure and have little scope for risk sharing because of their regional or sectoral focus.

As for the source of capital, about 53% of the respondents had used their personal funds, while those who acquired bank loan were just about 21% as shown in Figure 5. This shows that either bank loans are not easily available or most Equipment manufacturing SMEs cannot meet the conditions set by the bank to give out loans. Other mentioned funding included donor and government funds (6% and 17% of respondents respectively).

6.5. Access to credit facilities

Regarding the issue of funding and credit facilities, it was observed that most equipment manufacturing SMEs had problems with acquiring credits from financial institutions that address the needs for investment and working capital for small entrepreneurs. Technically, most entrepreneurs operate very small businesses which lack any sort of formal business plan or formalized financial information about profit, liquidity, sales growth and debtors, all of which may be necessary in assessing credit applications.

Further, SMEs have few assets to offer as collateral for loans from traditional debt-based financial intermediaries such as banks, and few equity markets organized to provide capital to them. As indicated in Figure 6, a total of 32% of respondents were unable to secure loans from financial institutions because they lacked proper financial records while 17% of respondents could not access credit facilities because they had few assets to offer as collateral for loans from traditional debt-based financial intermediaries.

However, 24% of respondents indicated that they managed to secure small loans from financial institutions. Further equipment manufacturing SMEs might have problem in convincing banks of their managerial competence which is an important consideration for financial institutional lenders. According to [20], apart from the strengths and limitations of the lending mechanisms already documented in different literatures, solidarity group lending has helped the SMEs access credit through peer
guarantee, rather than using collateral to banks for formal lending institutions.

Figure 6 Reasons of failure to access loan/credits

6.6. Equipment and machine condition of equipment manufacturing SMEs

The possession of modern equipment for production works coupled with the skills and experience of the workforce are two qualities that can propel the firm to become one of the fastest growing and most competent together with firms’ commitment to customer needs, translates into provision of quality-based services that are timely. When asked about the condition of their production machineries, about 45% of the respondents indicated that they were using old machines with low productivity while the 24% declared using totally obsolete technology as shown in Figure 7. About 14% of respondents indicated to have good machines although not enough for their requirements and only 10% declared to own good and enough machines.

Figure 7 Equipment and machine condition of equipment manufacturing SMEs

6.7. Equipment manufacturing SMEs legal constraints

Friendly institutional infrastructures e.g. low tax rates, avoiding bureaucracy in registration of businesses and land ownership will fasten SMEs growth and eventually fasten technology diffusion. High tax rates reduce firms’ internal sources of finance. Respondents reported some legal constraints associated with bureaucracy in registration of businesses (11%), business regulations and licensing (18%), high tax rates (46%) and land ownership (25%) as shown in Figure 8.

Figure 8 Legal constraints of most equipment manufacturing SMEs

6.8. Lack of marketing and entrepreneurship skills

A proper understanding of the marketing and entrepreneurship principles of the business assist the entrepreneur to plan and control production and distribution in a safe way. In the new knowledge economy, there is a growing demand for employee who have strong problem-solving abilities and creativity that is combined with skills training and an ability to meet the real world challenges of workplace.

Thirty five percent (35%) of respondents revealed that marketing strategies improvement rate in their SMEs was poor, 43% indicated fair improvement rate of marketing strategies while about 22% indicated good improvement rate of marketing strategies as shown in Figure 9. The results indicate further that most equipment manufacturing SMEs were traditional type of manufacturers who were inert to change. This was confirmed by nearly total lack of market information acquisition systems in the SMEs. As indicated in Figure 10, about 43% of respondents had only fair while 35% had poor market information acquisition systems. Only about 11% of the respondents claimed to have good market information acquisition system.

Figure 9 Marketing strategies improvement rate

Figure 10 Market information acquisition systems

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6.9. Equipment manufacturing SMEs product demand
SMEs struggle to ensure that the right product is available in the right quantities at operational level. Errors and delivery problems can occur and this is not beneficial for any SME’s reputation. Some SMEs have targeted specific customer service level, but have been unable to translate their growth plans into improved category performance, largely due to operational inefficiencies. Therefore, most of SMEs fail to select appropriate level of service for its customers. They should realize that, it is important to make each and every service encounter a positive experience for the customer, focusing on creation and building social bonds with customers.

When the issue of product demand was raised, about 39% of the respondents indicated that there was moderate demand for their products while about 56% indicated low or very low demand as shown in Figure 11. Only 3% of respondents reported high demand for their products. Low demand could be attributed by stiff competition, lack of promotion of products or poor product quality.

6.10. Market competition and product advertisement
Moving forward to effectively compete against imported products and into export markets will require Tanzanian equipment manufacturing SMEs to meet the competitive price, quality and delivery requirements demanded by the market; this will mean improving quality and cost of manufactured product and improving technology and manufacturing expertise in the sector. When asked about the nature of market competition for their products, nearly 48% of respondents revealed to have high/very high competition from different producers of the same products in their neighbourhoods while about 45% indicated moderate competition as shown in Figure 12.

On the other hand, a total of 47% of respondents had never advertised their products as indicated in Figure 13, which might, have been one of the reasons for low demand of their products. However, about 32% of respondents indicated that they sometimes advertised their products. Different types of promotion may be needed for each market segment. For example, low-income customers are unlikely to have access to television, but may listen to a radio or read newspapers. Posters or signboards along main roads and special promotions in retailers’ shops are likely to reach more people. Personal contacts with enterprises owners and managers may also be effective.

6.11. Equipment manufacturing SMEs trade fair participation
Several organizations reported initiatives that expose SMEs to trade fairs. In order to maximize the revenue-generating opportunities available at these events, SMEs must learn to effectively price, and display their products. Training approaches should be developed to meet this need. Respondents were asked how regularly they participated in international and national trade fairs. About 32% of respondents indicated that they had never participated in the trade fair due to the lack of funds, while about 47% indicated infrequent or sometimes participation. Only 21% of respondents declared often participating in such trade fairs as described in Figure 14.
6.12. Access to training in implementing technology and marketing skills

To succeed in the global, knowledge-based economy, where a qualified and highly skilled workforce is a key strength in the competitive market, an organization must produce, attract, and retain a critical mass of well-educated and well-trained people. The demand for high-level skills will continue to increase in all sectors, constantly upgrading the skill requirements in the labour market. Training provides the opportunities to learn the new expertise for the new technology set-up. Workers’ education, technical aid, and technical training improve a firm’s performance.

Thus, training promotes flexibility, contributing towards the improvement in the necessary critical skills for effective response to competitive challenges. Respondents were asked how was the situation concerning accessing training in implementing technology and marketing skills. About 4% and 54% of respondents reported very poor and poor situation respectively as shown in Figure 15. However, 18% of respondents reported to have good access situation while 14% declared very good situation. Limited access to formal training probably made it difficult for most of entrepreneurs to obtain the required skills.

7. Conclusion

Faced with the simultaneous challenges from large firms with concentrated market power and operating to equally in the same business technological environment, SMEs may feel as though they are being squeezed in a vise. The challenge to equipment manufacturing SMEs is to find ways to participate successfully under these conditions. Therefore, the success of industrial sector will in future depend largely upon the degree of which the country can develop, consolidate and strengthen technological innovation 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. The Tanzanian government should play an active role in funding the innovation activities in R&D institutions and universities and creating an institutional setting to foster collaboration networks and to nurture start-ups and make innovation possible, whereas R&D institutions/Universities should develop technologies that are needed by the SMEs and SMEs take the lead on deciding what innovative new products or process should be produced or provided.

Reference

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