

Technology Gap within Kenyan Textile Cottage Industries

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Abstract

Textile cottage industries in Kenya handle diverse products using different production techniques. The industries by virtue of being small and complex in their output have difficulties sustaining quality and quantity. One major reason for this is the technology disparities within the various cottage industries. This paper looks into the current technologies being used in their value addition processes compared to advancements that have been made in the same sector of manufacturing and processing. The shortfalls that come with the technology gaps have been critically evaluated and interventions proposed that could be used for successful business in the competitive markets.

Keywords: cottage industries, value addition, technology, competitiveness, cotton, carpets

1. INTRODUCTION

1.1. Background

The textile industry comprises a diverse and fragmented group of establishments that produce and/or process textile-related products like fibres, yarns, and fabrics that are further converted into apparel, home furnishings, industrial goods, and for technical application. Textile establishments receive and process fibers; transform fibres into yarn, or webbing in case of non wovens; convert the yarn into fabric or related products; and dye and finish these materials at various stages of production. The process of converting raw fibers into finished apparel and non-apparel textile products is complex (Allal & Chuta 1982; Collier 1970) [1, 2].

Conventionally, textile manufacturing is characterized by the use of technologies not only limited to advanced machinery for making textile products but also includes improvements on the production process itself. Application of techniques of industrial engineering, maintenance management and computer aided processes have improved the process further.

The continual improvement programmes like Gemba Kaizen has enhanced productivity and quality of products. An independent case study indicated that implementation of Gemba Kaizen management philosophy improved productivity of the company considerably, reduce material wastage and enhance overall profitability (First trust consultants

2002) [3]. Application of Enterprise Resource Planning in the manufacturing sector has led to improved levels of efficiency in operation, with basic manufacturing modules such as inventory, production planning, procurement, sales, and human resource being linked through an Information, Communication Technology (ICT) backbone. The overall effect of the linkages is seamless flow of information and activities right from raw material procurement through to the finished products, and their delivery to the customer. By use of these technological concepts, the enterprises are able to achieve optimal production of high quality goods at reduced production costs, thus ensuring customer satisfaction.

However, the use of technological concepts finds limited applications in the textile cottage industries. Cottage industries in Kenya are known for producing goods and services and play an important part in the development of the national economy. The products are normally consumed locally and the surplus exported, thus earning the country foreign exchange. The textile cottage sub-sector in Kenya includes among others the following: -

- i) Hand spun woolen yarn manufacture
- ii) Sisal fibre extraction
- iii) Hand woven carpet
- iv) Silk production
- v) Hand woven fabrics like 'Kikoi'
- vi) Micro and small garment production

Most cottage industries in the developing countries employ relatively old and or outdated technology in their production, with most production being done manually. There is little or no application of principles of product or process standardization, whereas in developed countries the basics techniques of production have advanced to automation and use of robotics (First trust consultants 2002) [3].

For the small scale industries to compete effectively within the market and have vertical linkages with big industries they have to improve on their level of productivity, standardize their products and monitor their quality. Textile cottage industries stand to gain immensely through establishment of outsourcing opportunities. For the textile cottage industries to outsource, they are required to put in place production strategies that allows for product quality and standardization in line with respective standard bodies existing within a country, e.g. The Kenya Bureau of Standards, International organization for standardization (ISO), and respective company's standards (Kebis 2009) [6].

The cottage industries can achieve these by adapting modern technology. Studies further show that the sector suffers from shortage of managerial skill and a scarcity of technological input (Nelson 2002) [4].

This paper therefore addresses technological characteristics of the textile cottage industries in Kenya, and

interventions that is required to be put in place.

1.2. Technological Characteristics of 1.2.1. Textile Cottage Industries

The cottage textile industries produce items in small quantities due to technological challenges they face during the raw material processing/conversions. The challenges are discussed based on each of the following sub-sectors within the industry: -

1.3. Hand Spun Woolen Yarn Manufacture

This forms one of the several small-scale textile-processing units in the cottage industries. The main processing activity carried out is the conversion of raw wool into yarn. In the conversion process, the raw wool is purchased from selected wool sale counters in various places within the republic of Kenya.

The conversion process involves, combing the wool by using a pair of combs, with the main aim being to card the wool and ensuring that the fibres are linearly aligned. Carded wool is then spun by use of a manual-spinning machine whose motion is provided by the spinner's legs and alignment of fibres for yarn formation by use of hand. Washing of the spun yarn is carried and the yarns then left to dry. Dyeing of the yarns may be carried out by the spinners, to the customers' specification or the yarns are sold in the spun form to consumers, who do the actual dyeing.

The wool spinning process has several challenges notably the low quality of yarns produced in comparison with machine spun yarn. The yarn produced is characterized with a bad odour even after the washing process and its cross-section is not uniform. Additionally during the washing process the fibres tend to form tufts which have a direct effect on productivity. Alignment of the fibres during the hand spinning process allows non-uniform distribution of fibres within the yarn cross-section and has thus affects the quality adversely.

This is in contrast to modern technology processing, which requires the wool to be sorted, scoured, carbonized (if necessary), wool drying, blending (if necessary), carding then spinning and twisting. Most of this process is controlled during processing; hence the required yarn specification for better quality carpet with no characteristic smell can be obtained. Due to the manual nature of spinning, the productivity of the spinners is low compared to mechanized production. Considering that spinning is a basic first process during the textile manufacture, its quality has a significant bearing on the final product that will be made.

1.4. Hand Carpet Weaving

The hand carpet weaving industry has been thriving in Kenya due to its products that have found their way into the international market mainly as curios. The weaving process is exclusively manual, with the use of mainly wooden looms. This inhibits on productivity in

comparison to medium and large enterprises that apply mechanization during the production process. The main raw materials used in the conversion process are mainly hand spun woolen weft yarns and cotton/polyester for the warp yarns.

The carpet weaving production process is labour intensive and takes the weaver a couple of days to produce a single carpet, and this translates to high cost of production. The scouring process of the wool is not thorough such that the end product (carpet) usually has a characteristic smell. The evenness of the weft yarn used (wool) is also questionable, compared to conventionally processed yarn from the wool.

The weaving process commences with preparation of a wooden loom frame to square or rectangular configuration. Nails are then fixed on the top and bottom's frames of the vertical loom. The purpose of the nails is for tying the warp yarns, in a specified pattern as to allow for separation of the warp sets for ease in shedding. Next, the weft yarns are dyed to match the customer's specifications and pattern to be made. The size of the vertical loom frame is dependent of the size of the carpet to be woven, and this varies from standard rugs size to large carpets of up to 3 metres in length. This causes technological challenges during the weaving process with the need for scaffolding to be put in place. A study of select hand carpet weaving industries in Kenya revealed immense challenges during the weaving process, since due to the highly manual

nature of weaving, time is consumed during weaving. Also due to the fixed loom design, a frame has to be fabricated from each carpet woven and this lack of flexibility in frame adjustment has a cost implication to the final product woven. Shedding, weft insertion, and beat-up process are manual and affect the weavers' productivity. The warp ends for the weaving process are also prepared manually by tying them on the looms to produce the carpet.

1.5. The Silk Production Process

The silk production process is one of the main textile cottage industries in Kenya. Most of the entrepreneurs dealing with this activity do not actually realize enough income from their activities due to the level of technology they apply.

With modern technologies the cocoons can be reeled by farmers hence the farmer can sell the filaments yarns and would thus realize more profit from their products.

1.6. Hand Woven Cotton Fabrics

The handloom woven fabrics and garments have gained popularity due to their use as curios and their high value due to customization of the products made to suite the consumers tastes. The weaving process is mainly manual and like all the hand spun yarns and carpet weaving processes, done by hand. Opportunities created by the AGOA initiative allowed access of such products to the United States of America. Despite access to such markets, the production scale for the fabrics remains low due to the nature of

operations. Lack of access of information by the weavers in the existing markets and the procedures that is required to be followed in order to access this markets exposes them to exploitation by middlemen. Sales quotas set for exportation remains a big challenge in the weavers due to the small nature of the enterprises and the quantities of products produced.

2. CONCLUSIONS

Based on the fore mentioned select textile sub-sectors, further studies (collier 1980) [2] show that cottage industries are dependent for their equipment and process technology on limited resources. The knowledge of production is normally limited to the owner and a few individuals around him. The skill is earned at an early stage in his/her carrier and seldom developed.

From the technological challenges mentioned above, it is evident that the Kenyan cottage industry's still lags behind and this has an effect on their competitiveness.

Market structure barriers make the cottage industries marginal player with no virtual impact on technology transfer or development. Limited resources are the mostly cited problem almost everywhere. It has been reported that this sector has limited access to facilities from the banks. The banks find the risk being higher due to the inability of the entrepreneur to exercise control due to lack of proper managerial skills.

3. RECOMMENDATIONS

If the cottage industries were to be elevated to a higher level in order to increase their productivity and also to improve on the quality of their products a number of issues have to be considered.

3.1. Application of Appropriate Technology

There is need for applications of appropriate technology in the cottage industries. A paper published by The food and agricultural organization (FAO) and the Agricultural and Food Engineering Technologies Service (AGST), highlights various appropriate technologies targeting the cottage carpet, silk and hand woven cotton fabric industries, which are not only easy to use, but are also easily constructed using local materials (Allal & chuta 1982) [1]. An example of an equipment outlined in this document is focused on the processing of fresh cocoons into raw silk thread and yarn for use in crafts such as carpet making and hand weaving. Figure 1A, shows the plan elevation. While Figure 1B, shows the normal view of the machine.

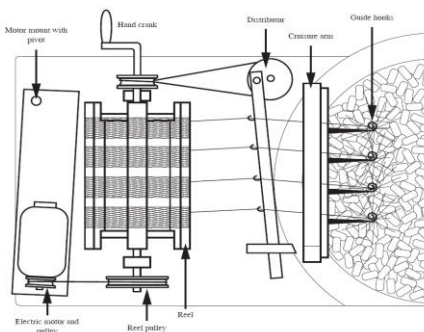


Figure 1A. Top view of the silk hand reeling machine



Figure 1B. Silk hand reeling machine

Use of technologies as shown above (young 2009) [5], will enable silk farmers add value to their silk cocoons, and hence sell their products for a premium price. Such technologies are readily available and detailed information can readily be obtained from the web site of AGST. Additional technical construction drawings for carpet weaving looms and the cotton weaving looms are also contained in the document.

3.2. Formation and Strengthening of Savings and Credit Societies (SACCOS)

Access to financial facilities is a very important consideration for the sustainability of the cottage industries in Kenya. However due to the stratified nature of operation and conditions attached to lending by the main financial institutions in Kenya, credit availability still remains a challenge to contend with.

The role played by the micro-finance institutions in Kenya has played a significant role in the availability of credit to

the textile industries. It is thus important that special credit schemes be allocated to specific textile sectors. The textile cottage industry in Kenya mainly consists of persons who can be termed as marginalized; i.e. women and youth and special emphasis needs to be directed to them. By assisting them in the formation of associations and SACCOs, which will allow the industry to engage in capital formation. Alternatively grants and donation from the developing countries should be sourced for, to increase on their technological base.

3.3. Creation of Business Incubation Centers for Textile Cottage Industries.

The Ministry of Trade and Industry (MoTI) is in the process of developing a policy paper, which on implementation opens the way to the formation of business incubation centers in the urban and rural, technical and higher institutions of learning. The policy provides the creation of partnership between select key stakeholders. The business incubation centers will be run and operated by skilled professionals who will include scholars, researchers and business persons. In addition, researchers, proprietors of the business incubation centers and cottage industries will have access to installed ICT services that will allow access to both local and international markets, and technologies, with effective dissemination of findings back to the stakeholders being facilitated by the MoTI.

3.4. Application of Standards in Manufacturing.

Standardization in Kenya is currently being conducted by The Kenya bureau of Standards, (KEBS). Their mandate is to ensure that products being sold in the market fulfill specific criteria of standardization set by KEBS, ISO and other recognized bodies. Standardization allows for uniformity in the market and protection of products in the market, protection of consumers, and competitiveness of products both in the local and international markets. Established manufacturing enterprises are required by law to adhere to the code set up by the government, but however this is not the case for the textile cottage industry, with codes that will compel products produced to adhere to standards. This has an eventual impact on the price of products manufactured because apart from their value as curios, the lack of standardization limits its entry into select markets. Thus KEBS needs to draft a set of standardization codes and facilitate their implementation in the cottage industries.

3.5. Research into Technologies and its Effective Dissemination

A survey to identify specific needs for different textile cottages industries needs to be carried out. This would be analyzed in order of priorities, depending on whether they are technological requirements or managerial, which would eventually affect their marketability.

3.6. Education and Training

Proper training of the employees needs to be performed.

It is common that most of the cottage industries are run by polytechnic and college graduates with very particular skills of which when sharpened, they can produce better. "The training should not only impart new skills and knowledge but it should be an integral part of the process of innovation" this would arise the need on training on modern technological and management skills, where the sector would be required to handle change process.

3.7. Formation of Cottage Industries Corporation

Once the corporation is formed, it will act as the dealer or agent for the products. It will also develop the market locally and for exports.

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