

CIRCULAR ECONOMY: A PERSPECTIVE OF ETHIOPIAN TEXTILE SECTOR

Ravindra Pathak¹, Allene Endayilalu²

Department of Mechanical Engineering, Ethiopian Institute of textile and fashion Technology, Bahir Dar University, Ethiopia

Abstract

Since the first industrial revolutions, industries and consumers are following the linear economy model of the value creation that starts with the extraction of resources and end with waste disposal. The industries concerned only with resource utilization for conversion raw material in goods and making profit. In the present scenario of the environment and endless utilization of natural resources, the circular economy for the textile and apparel chain very important. This paper covers the present linear economy of the Ethiopian textile and apparel chain with the possibility of circular economy ecosystem in the chain on the basis of basic principles and important factors, which can affect the implementation of circular economy in the Ethiopian textile market. The focus on fundamentals of circular economy in the context of Ethiopian textile and apparel chain, and representation of present scenario of the process and various factors associated with the value chain from raw material to end user.

The ultimate aim of circular economy is to maintain the quality and quantity of material, with minimum possible environmental impact and resource utilization to maintain the value of materials as high as possible, with minimum environmental impact. In the Ethiopian textile sector needs improvement in textile production process as well as effective use of poor quality raw material and sorting of non reusable resources. Ethiopia is contributing in US and Europe textile market and possible use of recycled textile material can heavily impact on the global textile waste problems.

Keyword: Circular Economy, Ethiopia, Textile sector

1.INTRODUCTION

The rapid industrialization and growth of textile industry are the basic reasons for the more waste generation by the textile industrial sector in Ethiopia. Current practices and process followed by the industries for preventing the pollutions are inadequate to control the amounts of waste generation and resource utilization. The amount of waste is the shows the overconsumption of the resources and weak pollution dispose system [1]. This study explores the current situation of the Ethiopia textile and apparel industry and its current inadequacy for the implementation of circular economy in the textile sector chain. The successful and gradually implementation of circular economy can lead for better and sustainable development of this sector as well as whole Ethiopian economy.

1.1.The textile and apparel Industry in Ethiopia

In Ethiopia textile production started in 1939 with the Dire Dawa Textile factory and in 1958 Addis Garment PLC. Up to 1991 , 19 textiles and garment industries established but after the adoption of free economy its increased over 90.In 2016 according to the Ethiopian Textile Industry Development Institute (ETIDI) there were 24 textile and apparel mills , 23 textile mills , 72 apparel and 8 handloom factories registered and in the last few years , Ethiopia's textile and apparel industry has grown at an average of 51%, and more than 65 international textile investment projects have been licensed for foreign investors during this period. In 2020, exports of garments projected around one billion USD and 350, 000 jobs are expected[2,5].

Ethiopia has a prehistoric tradition in weaving, and now the African Growth and Opportunity Act (AGOA) encouraging significantly new investment and ventures, trades and jobs not only in Ethiopia as well as whole

Africa. The African, Caribbean and Pacific - European Union (ACP-EU) and other international agreements also big opportunity for the economic and commercial reform of Africa and contribution in the international economy. Now the Tunisia, Madagascar, Mauritius and South Africa are major player in textile and garment sector for exporting in the western market.

Ethiopia also successfully taking the advantage of the international agreements and now the fastest growing economy of Africa and this is the reason many Turkish, Indian and Chinese textile companies invested in Ethiopia , not only for utilization of cheap labor and resources as well as taking the advantage of AGOA and other international opportunities[2].

Ethiopia's economy is primarily based on agriculture, but due to the government initiative for the growth of textile and garment and manufacturing industry, trend shifted towards textile, garment and manufacturing industry. Growth and Transformation Plan (GTP) II focused primarily on development of industrial parks and attracts Foreign Direct Investment (FDI) in the sector of textile, garment and manufacturing. The government established Ethiopian Industrial Development Zones Cooperation in 2014 for the development of industrial parks for establishment of new foreign projects and increased competitiveness of the projects in the global market by different facilitates like low cost electricity ,water. Recently in July 2017 Kombolcha Industrial Park inaugurated and opened for the industry with in 75 hectares of land, it has 13 industrial sheds and will create jobs for 20,000 people. The industrial park is dedicated to apparel products. The government has an objective to generate 30 billion U.S. dollars in export from the textile industry by 2030 and create a strong foundation for industrialized Ethiopia by 2025. For achieving the targets and attract FDI, government offering some incentives like cheap land cost, corporate loans at subsidized rates and custom duty exemptions for machinery and equipment . According to the Ethiopian Investment commission, Ethiopia is one of the top performing African countries in FDI flow, registering a nearly 4 billion USD in 2018 fiscal year and issued license for 275 foreign projects.

The main requirement of global garment brands are quality with minimum cost and now due to increasing wages in Asian countries, the textile and apparel demand is shifting towards Africa and countries like Ethiopia. Ethiopia has been a very potential country for

textile and garment, not only due to cheap labor but also some promising factors and government efforts are creating positive atmosphere for development of industries.

- Ethiopia is boosting the industrialization and with the least cost of land also increasing the power generation capacity by constructing dams and renewable energy.
- Infrastructure projects for strong supply chain; roads, rails, airports and connectivity of industrial parks and ports.
- Ethiopia is the largest country in the world by land size and moderate temperature due to elevation Much of Ethiopia has a surprisingly temperate climate by African standards due to its elevation.
- Ethiopia is the key center of international organizations such as the African Union (AU) and the United Nations Economic Commission(Africa)
- Educated human resource available in Ethiopia due to universities and TVET institutes for skill development
- Around 100 million potential customers in country

As a whole, the Textile and apparel industry is a priority sector for development and growth of Ethiopia. The industry is also playing a major role for ongoing industrialization effort for boost export, FDI and creates job opportunities for the young population.

1.2. History of circular economy

Even though there is not authenticated and clear information about origin of the concept of circular economy but with the other concepts and related terminology, it is started in the 1970 and promoted in the modern production system in 1990. The main contributors for development and research of concept of circular economy in the modern economy are John Lyle, Walter Stahel, Michael Braungart and William McDonough. The economy and the environment coexist in equilibrium and the natural resources are limited and for maintain equilibrium in the system, circular economy is needed for value chain. The main idea of circular economy that, consumption of services should be promote rather than product and the customer should be only user , not the end consumer and the cost only

for using the product not for ownership of the product. By this idea the company can focus on long term high quality product rather than short term low cost products but in all products this idea cannot be implemented. Another idea is based on the recycling of the product and industry can get the benefit by reusing of the used products as the raw material or resource[6].

In 2010, Ellen Macarthur foundation established for promoting circular economy among the customer and industries to think in different ways and initiate smooth transaction from linear economy to circular economy.

The circular economy (CE) concept is using for environment protection and development of sustainable economy. In the development of this concept lots of author and researcher was involved but in the modern industrial time importance of the circular economy has been practiced by the European Union (EU) with the creation of circular economy package and implementation initiative in 2015 for closing the loop of production supply chain. The transaction from linear economy to circular economy is basically shifting from end-of-life concept of products. The saving and restoration of resources, development of renewable energy, design and development for re-use, waste minimization are the basics of CE[29]. Smooth transition of the industry towards circular economy, process standardization and easy to use technology is compulsory otherwise the replacement of present linear economy impossible due to easiness and comfortable chain for industries and customers[7].

The CE concept is associated with various other concepts like Eco-city, which is rapidly developing in the Japan and Singapore like countries. Germany introduced the CE for the environment protection and economic use of the resources for economic growth and sustainable growth. In the China also this concept is primarily introduced for the eco industrial park development and after that waste recycling is also included in the industry but china used this concept for product and technology development, upgrading equipment, low cost raw material for increase in the profitability of the industries. [8]. In the United Kingdom and Denmark, CE is not only used as business model for recirculation of the material, as well as increase the customer awareness about waste utilization and promotion of reusable material products [9]. North America and Europe, enhancing the reuse of materials on the basis of research on product life cycle

concepts. Netherland also actively strive for zero waste economy and government working on the different projects of design for re use and sustainable production and procurement practices.

In the report of Relooping Fashion Initiative (2015-2017) explained the principles of the circular economy specially in the perspective of textiles and given main emphasis on repair, reuse as product and material and recycling of the product in entire value chain of textile. World Business Council for Sustainable Development (WBCSD) also taking the initiative and now international corporations simultaneously working towards sustainable business practice. This project supported by leading industries of the world.

In recent report on circular economy by "European Technology Platform for the Future of Textiles and Clothing" emphasize on different areas for implementation of circular economy in the European textile industry but this innovative areas are similar important for all other textile industries. Firstly, digitalization of products in aspects of design, manufacturing, logistic and supply chain and then sustainability and circularity with apparent supply chain for environment, social and health standard. Report also pointed the sharing of resource and final products by new ventures and consumption models. These are all areas very important and innovative for implementation of circular economy in textile sectors[10].

International clothing retailers creating awareness about the new system for textile industry and minimization the side effects of the linear economy model "take-make-dispose" and promoting the circular economy in the international textile market by different projects like "build a circular economy for textiles,"

Cotton made in Africa (CmiA) working in Africa for promoting and offering sustainable raw material for the different production houses and increasing the awareness among the consumer and producers of textile and apparel value chain.

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) from Germany taking initiative in Ethiopia for increasing the sustainability in the textile by the developing methods and training program for Ethiopian textile and apparel industries. By the Sustainable Textile Program (eTex) and International Water Stewardship Program (IWaSP) ensuring textile industries for compliance of international standards of environment and social perspective and with the help of

other international organizations, Ethiopian government also taking the initiative for increasing sustainability and environment friendly aspect in whole textile value chain in Ethiopia.

2.TEXTILE SUPPLY CHAIN IN ETHIOPIA

The conventional or linear simplified model of textile supply chain starts from cotton to fibers and then by different process converted in garments and after the end use of consumer, it converts into the waste. In the whole process of production different chemicals used and emitted into environment and at the time of using also pollute the surrounding[11].

The process from fiber to garments is complex and difficult, with combinations of different processes and machines. Value chain can be organized vertically, where all process can be finished by same industry or combination of different industries based on process specialization.

Ethiopian textile and apparel chain has long, complex and fragmented supply chain like in other textile production countries. It starts from cotton cultivation and procurement to garment and other finished product's shipping.

Ethiopia textile and garment sector started with the cotton and by value addition at different level up to the clothing, with the help of different national and international ventures established for the development of textile and garment sector.

In the linear chain of textile included ginning, spinning, weaving or knitting, dyeing, printing and knitted or woven garment production. The major industries are privately owned; state owned and joint venture of state and foreign investors.

2.1. Cotton

Cotton is the basic and important input in the value chain of the textile. In Ethiopia has about 3 million hectare of land suitable for production of cotton. In the wash valley, more than 50,000 hectares land under cultivation of cotton and rest part cultivated by small farmers. In the some areas of Ethiopia like Omo-Gibe, Baro Akobo ,Wabi Shebelle and Blue Nile basins. Now also in Africa cotton producing countries, the Ethiopia on the competitive rank but the demand and supply of the cotton in Ethiopian textile is not balance due to

different reasons like climate, agriculture facility .In present time lots of foreign investors started textile plants and the demand of cotton will increase with time so Now Ethiopia looking for considerably increase in production of cotton for fulfillment of present demand of textile industry of Ethiopia.

2.2. Yarn spinning and combing

The spinning sector in Ethiopia is organized by different national and international ventures and internationally very competitive in all aspects of process and production quantity. The spinning process is quite exhaustive in terms of technology and the output also depends upon the fiber and processing of cotton and raw material[12].

In the Ethiopian spinning enterprises main focus on rotor spun carded yarn, combined yarn, ring spun carded yarn and sewing thread. Spinning industry purchase local cotton lint but the supplies is not enough to fulfill the demand so according to the policy of government, additional lint also import sometime.

2.3. Weaving and knitting

Different companies involved in the area of weaving and knitting in the Ethiopian textile and apparel chain. According to the different reports and data of Ethiopian Textile Industry Development Institute, Ethiopian textile and garment manufacturing association, in this sectors are 32 different integrated and semi integrated, fabric producing and tactile companies working in this area and continuously increasing the players due to rapid foreign investments in this area and development of industrial parks with facilities[10,14].

2.4. Textile finishing and processing

In the supply chain of textile for value addition in the textile products, textile finishing and processing is very important player. In the Ethiopia raw material and chemicals required for the finishing and processing, mainly imported from the international market. According to the Ethiopian Textile Industry Development Institute, now the more than sixteen units are major players in this segment some of them are state owned and others private and joint ventures of Ethiopian government.

2.5. Sewing and design

This important segment of Ethiopian textile and apparel chain, Sewing and design producing range of menswear, women wear, undergarments, uniforms, sportswear and home textile products. In domestic market involved companies garment companies, import fabrics from other countries and other textile mills produce export quality products for European and US market. The handloom product is also playing role in export market and demanding in international market.

3. REASONS OF ADOPTING CIRCULAR ECONOMY

The circular economy, basically an economic modeling by which restore the resources, raw materials and final products and increase the life and at the end of use back in the cycle instead of waste generation.

In the circular economy, main focused area is closing the loop in cycle and use waste as input in the cycle. The important aspect of circular economy is systematic designing of product and process by which it can easily convert as input after the end use.

In this aspect, Michael Braungart and Bill McDonough brought the Cradle to Cradle™ concept. In this concept major emphasis on elimination of concept of waste, use of renewable source of energy and respect the interdependent relations of human and nature.

According to the European Commission report, The circular economy can be contribute to develop a sustainable, resourceful and competitive modern economy and boost the competitiveness of industry by availability of resources and creating new opportunity by innovative business strategies. At the energy and development of more efficient processes with environment sound technologies[15].

The transformation of linear textile economy to circular economy can be possible by different approaches. Firstly the important approach is circulation of waste into the product cycle and secondly increasing the life of the products and effectively utilization of resources. In the supply chain of the textile and garments, customer's commitment, habits and attitudes are also important. The whole supply chain consist of different industries and collaboration so changing into the circular economy is not possible by the single industry or groups, that is collective responsibility of whole

supply chain and minimization and recycling of waste at every possible level.

3.1. Environment

The textile industry is the most polluting segment of the industries. The pollution is associated at the every level of production and even after the production at the time of use also clothe pollute the environment.

3.2. Raw materials

The fabric in the textile is the basic requirement and even at the time of cultivation lot of waters and pesticides need in the case of cotton and in the production of synthetic fiber, required lots of energy. The use of organic cotton is the alternative of this problem and this is well known fact that elaboration of synthetic fibers possesses toxic materials and required polluting process for manufacturing.

3.3. Production

In the processing of the textile, large number of chemicals and toxic materials used, which is the main cause of environmental pollution as well as health of human beings. The chemical residues pollute the water and also affect the consumer health with emission of carbon dioxide in the atmosphere.

3.4. Transport

In the whole supply chain of textile, raw material and finished product export and import in all worlds according to the requirement, these transport emissions also the cause of environment pollution.

3.5. Use

The use of cloths is also the cause of the pollution, since washing and drying of cloths also create great negative impact on the environment. Most of the softeners contain ammonium composition, which affects the consumers. After the uses of the cloth, most of the percentage is going into the waste.

3.6. Safety and health of workers

In the maximum textile factories, labors are working under the stress and continuously contact with different chemicals from start to finish the process. In the actual condition, small and medium factories not follow the government rules about safety and security of the worker, which is main cause of accidents and health problems.

3.7. Poverty

The most of the textile companies in the developing countries provides employment for the unskilled labor but in the same time there is no chance for professional development and improvement in the life. Basically, the circular economy is the new model of reused and recycled of the used products in the continues cycle and the implementation of this model can contribute in creating new jobs, less polluted environment and improved human life.

4.MAIN CHALLENGES IN TRANSITIONING TO THE CIRCULAR ECONOMY

The implementation and management of the circular economy depends upon the technology, awareness and collaborative efforts. In the implementation process, the circular economy should be applied in the whole system of production, use and reuse. So the main challenges are economic use of material and energy, less use of chemicals, design for recycle, use of renewable source of energy and increase product life.

The elimination or minimization of waste after the using of the product is the main challenges for the circular economy and this is the possible only by adoption of new technology and completely new approach for design, production and reuse of the material.

Effective waste management is possible only by increasing the usage of waste as raw material, reusing and recycling of garments. However, waste management depends upon the primarily recycle approach in design phase only.

There are the main challenges for closing the loop in textile supply chain in Ethiopia.

4.1. Financial barrier

The initial cost associated with the sustainable technology is very important factor. Implementation

and management of circular economy required high investment for technology adoption and training of human resources. The cost of sustainable raw material is also high with comparison of conventional material and overall the initial cost of product would be high.

4.2. Lack of government support and motivation

Circular economy is the new for Ethiopia and some companies working with the international organization for sustainability and reuse of product but for whole economy drive some encouragement and motivation by government is needed like extra financial loan, tax benefits, special zone for industries, using the sustainable solutions and reusing the waste[16].

4.3. Lack of information

The lack of information about the benefits of the implementation of circular economy is one of the important barriers. In the initial stage the investment in the adoption of circular economy is high but in long run of production beneficial for the company. The major advantages based on environmental benefits and the positive image among the existing customer.

4.4. Lack of technical skills

The conventional production and linear chain is easy and cheaper so most of the companies don't want to change in the existing system. The sustainable technology is costly comparison to the existing technology, so the management avoids the new rested in experiment with the product and process[18].

4.5. Lack of support from demand and supply network

Although companies are aware about the sustainable economy but the dependency of other vendors creates the problem in implementation, due to higher cost and less customer demands, vendors and other supply chain component not agree to support the circular economy. Waste creation

The linear model of textile promotes the huge quantities of textile waste, because clothes are discarded after use. There is also the issue of the used clothes in the country even after the initiative of the governments; here used

clothes are also in market and increasing the problem of textile waste[19].

In the Ethiopian textile industries, waste generate different points, like the waste generated by the industries, unsold at stores and waste by consumers. The major challenge is minimization the waste at origin and reuse of remaining waste as raw material in the cycle. In developing countries collecting the waste and proper processing is also difficult work.

5. FACTOR OF EFFECTIVENESS AND ECONOMIC VIABILITY OF CIRCULAR ECONOMY

The recycling of the textile and clothing depends upon the several factors, like the available technology infrastructure, physical condition of waste, wear, used fiber quality, types of garments, possible use. The different factors can be dividing according to the stages of garment life cycle[20].

5.1. Design Modification

The product design is the primary phase of the textile process and this stage the performance and the quality can be define. At this stage , all the consideration affect the product life cycle because in this stage only the different parameters like quality of raw material, process selection, dyes, chemicals , finishing process, and the possible disposal of the product by the customer can be decide. The recycling options and sustainability can be introduced at this stage for possible best recycling of the material. For example, fiber blend is necessary for customer satisfaction but the recycling of fiber is very difficult in mix fibers. This type of problems in circular economy can be solve only by design modifications, interdisciplinary approaches and resource – efficient solutions[21].

5.2. Advance Recycling Technologies

For effective and better utilization of waste the collection and sorting should be efficient and scientific. In the stage of waste generation awareness about reuse and recycle is must[22].

At the level of consumer disposal level, without education and awareness waste cannot be collected in appropriate way. Without awareness and education the collected waste may be low quality material and blend

with foreign particles can reduce the efficiency of the recycling process[23].

In the companies proper infrastructure and process should be introduced for effective use of waste, otherwise the efficiency of the recycle waste would be less. Technological awareness in the industry and possible entry point of waste in the supply chain is very important for appropriate selection according to the financial requirement. For the implementation and starting the practice of circular economy, common platform of all industries and experts are necessary for exchanging the data and technology for implementation of circular economy in the whole supply chain of the system[25,26].

6. CONCLUSIONS

The implementation pathway of circular economy for Ethiopia is a complex process and it needs the clarity and broad vision on existing practices. The sustainable development of Ethiopia should be planned manner; progress may be slow or not up to the mark but needs to be started as early as possible. Awareness towards sustainability and circular economy, in industry and consumers should be increase by effective methods.

In textile sector of Ethiopia, efforts are already being working in some organizations but it is only at the small scale. In the linear economic model, the main basis is extraction of material then processing for short life cycle and after the use covert into the waste product. But continuous extraction of very limited resources and disposal of waste into the atmosphere is now creating the problem for the human being.

However, circular economy was proposed few years ago and the main important thing is conversion of waste material into useable form and taken as raw material in to the cycle. By the reuse of material only, the extraction of material can reduced as well as processing pollution also can be reduced.

We know that circular economy is the advantageous and in the long term it is very beneficial for the whole economy but the implementation of circular economy in the developing country is quite difficult by the different reasons and nonconventional nature. The major role in implementation of circular economy is environmental and social awareness of society and in the industry and only the customer can be influenced the industry. In textile industry also some companies are working in the

different areas of sustainability and the consumer awareness is the basic reason, but most of the companies not willing to adopt the innovative technologies for the implementation of the circular economy? The lack of strong rule and regulation for adopting the circular economy is also prime reason because most of the government rules for environment protection centered only and companies also not following in the same way.

The important thing is that, the companies can survive with less profit for environment protection but human and environment cannot survive with high pollution and toxic chemicals.

This is the fact that, full implementation of circular economy in the developing countries not possible this time but with the some extends its can be implemented. Initially the investment is high and the profit is also less in starting time of circular economy and this is the main reason that most of the companies are not interested in the implementation but these are short term problems. Whenever the circular economy would start in the full swing, the competitiveness of the society and economy will increase and due to the higher purchase capacity of the consumer, ultimately the profit of the companies will also increase.

The implementation of the circular economy is the responsibility of industries as well as consumers because the ultimate aim of the circular economy is the safe and healthy environment for the human beings and saving of the resources also the beneficial for the humans in near future.

The circular economy would bring the quality and safe life of human beings by less polluted environment with minimum use of natural resources.

7.ACKNOWLEDGEMENT

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