UNIVERSITY OF NAIROBI

SCHOOL OF THE ARTS AND DESIGN

FACTORS INFLUENCING THE ADOPTION OF SILK RAW MATERIALS FOR SUSTAINABLE GROWTH:

A Case of Garment Makers in Nairobi, Kenya

By:

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DECLARATION

Declaration by Student

I, Rosemary Awino Orina, hereby declare that this Research Report Project ,
presented in fulfillment for an award of Master of Arts in Design (MA DESIGN) is
my original work. This work has not been presented in this or any other university for
any other examination body.The research represents my own opinion and ideas and
not necessarily those of the University of Nairobi.

Sign: …………….............................. Date: …………...............................……

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Declaration by Supervisor

This Research Project Report has been submitted for examination with my approval
as the student's Supervisor.

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Director, School of the Arts and Design

DEDICATION

This study is dedicated to my children; Eric, Linnet, Linda and Martin for their support, encouragement and understanding during the entire period of this study. It is also dedicated to Engineer Manyala J.O for his continuous support, my mother, siblings and friends who prayed and stood with me during the difficult times. God bless you all.

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ABSTRACT

Garment making Enterprises in Kenya have been affected drastically by continuous closure of textiles industries (from 52 Mills in 1984 to 15 main textiles mills), rendering the sector to import expensive synthetics and other natural raw materials. This is as a result of inadequate textile raw materials due to climate changes caused by global warming. The objective of the study was to investigate the effect of adoption of underutilized silk materials by garment makers, in Nairobi, Kenya and perceived economic benefits on the adoption of silk raw materials in relation to social cultural attitudes on the adoption of silk raw materials. The study population comprised of all the Garment shop owners in the Central Business District of Nairobi and its environs. Purposive, snowballing techniques were applied to deduce the sample. The sample of the study was 54 Garment shop owners in the CBD and its environs. Consumers and two case studies were conducted at Gramwa Hand-crafts and Kiko Romeo, using collective method of case study. Primary data was collected through the administration of the questionnaires, which were first checked for completeness. Data gathered from correctly filled questionnaires was coded, tabulated and analyzed using Statistical Package for Social Sciences(SPSS) by both descriptive statistics which included mean and standard deviation to capture the characteristics of the variables under study and inferential statistics which included regression coefficient which was used to analyze the relationship of the dependent and the independent variables. Editing and coding was used to give a clear picture of the targeted objectives while frequency distribution enabled the researcher to meaningfully describe the distribution of measurements used as graphs and charts. This analysis enabled the researcher to establish the effect of adoption of silk materials by garment makers, in Nairobi, Kenya. Based on the findings above the study concluded that cost of silk, skills and competence perceived economic benefits, social cultural attitudes and technology, greatly influenced the adoption of silk material by small scale garment makers. The study recommended that Silk reeling units should be established in the counties which have sericulture farms and at least one weavers training centers should be opened having free training and lodging facilities. Also there was needed sensitization and awareness programs to inform the garment makers and end users of the uses, economic benefits and maintenance of silk products and raw materials.

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DEFINITION OF TERMS

Adoption	To take as one's own after full information about its potential and desirability; or utilize efficiently of new object or idea in technology for one's own benefit, growth and sustainability.
Cotton	It is a fiber that grows from the surface of the seeds in pods, or bolls of bushy mallow plant. It is composed of a substance called cellulose and therefore belongs to that group of yarns. Other groups of yarns are synthetics, metalics, chemical, protein and vegetable in nature.
Culture	This includes beliefs, morals, laws, customs, art/ artifacts and any capabilities and habits required and formulated by a particular society.
Enterprise	This is a business firm or a project requiring originality or boldness and innovation
Garment	This is designing using available materials and techniques to form clothes and accessories.
Globalization	This is a process of integrating international markets leading to inter-dependence; it covers investments, trade and migration. It was consolidated in the mid-90s with the establishment of the World Trade Organization (WTO). (Chemigech M, et al, 2013): Policy Research on The Kenyan Textile Industry)
Growth	Here used to mean that which is not stagnant, but is able to experience change for better, economically, socially and sustain the industry and the natives at large.
Innovation	Involves the introduction of new ideas
Silk	It is a protein polymer secretion in the form of a continuous filament produced by silkworm (insects and spiders); a polymer in which the principle amino acid are constituents are sericine, glycerine, alanine and tyrosine.
Small Scale	Small scale businesses (SME's) can be both formal and informal sectors that are classified into farm and non-farm, employing between 1- workers. The National Micro and Small Baseline survey (1999).
Social cultural	Associated with the environment (family, peers, church, community and one's source of information) that affect the consumption or purchasing decision making
Sustainable	That which can enable the development and growth of humanity

socially and economically

Value Chain   This refers to activities, processes, production, firms and partners involved in developing a product; fashion or textile value chain.

LIST OF ABBREVIATIONS

ACTIF   African Cotton Textiles Industries Federation

AGOA   African Growth Opportunity Act

CAD   Computer Aided Design

CAP   Community Action Program

COMESA   Common Market for Eastern & Southern Africa

EAC   East Africa Community

EPZ   Export Production Zones

FTA   Farmers Trade Association

ICIPE   International Center for Insects Physiology and Ecology

JETEMS   Journal of Emerging Trends in Economics and Management Sciences

JICA   Japan International Cooperation Agency

JUA KALI   Hot Sun or acronym for small micro enterprises

KALRO   Kenya Agriculture and Livestock Research Organization

KIPPRA   Kenya Institute of Public Policy Research & Analysis

MOT   Ministry of Trade

NGUVU KAZI   Hard work

NJEMA   National Jua Kali Entrepreneurs and Markets Association

SME's   Small Micro Enterprises

UNIDO   United Nations International Development Association

CHAPTER ONE: INTRODUCTION

1.0 Overview

Garment makers in Kenya have been affected drastically by the continuous closure of textiles mills due to lack of raw textiles materials. This is due to climate changes caused by Global Warming. The cotton industries in Kenya shut down from 52 Mills in 1984 to 15 central textiles mills, rendering the sector to importing expensive synthetics raw materials. Kenya Textile Industry comprises of 170 medium and large companies, over 75,000 Micro and Small Scale Garment shop owners, including fashion designers and tailoring units. The Fashion and apparel exists as the most important business occurring inside Export Promotion Zones(EPZ): EPZ enterprises occupies 29%, EPZ local employment is rated at 78%, the total EPZ sales is at 52% and EPZ Private Investments is at 30%. Kenya, among other Sub-Saharan African Countries, was rated the highest exporter to the United States Market under the African Growth Opportunity Act (AGOA). It displayed shares amounting to US$261 (31.6%). (Policy Research on the Kenyan Textile Industry, Funding, and Recommendations, June 2013). The growth of the local Textile Mills would be apparent if it supplied fabrics and raw materials to the apparel factories exporting through AGOA. However, the supply is connected to imports from outside the countries. Fabric sourcing as a raw material is a critical factor in textile manufacturing for export. The value chain has a disconnect between the apparel/ garment and the rest of the chain value(ACTIF).

1.1 Background of the Study

The issue of second hand ('mitumba') or 'thrift shops' as termed in Europe and the United States of America, had also interfered with garment industry, especially when it became commercial rather than clothing for the poor. Second-hand clothing trade occupies 17%, new ready-made 32%, locally manufactured 14%, customer-tailored 37% of the apparel trade in Kenya, (Imo B. E and Maiyo R.C.). Second-hand clothing is the second largest employer of mostly women and minority groups. This is because of the accessibility, reliability, competence, awareness, liability and most of all, affordability. But more notably is the fact that second-hand clothing traders are not

innovative due to readily available merchandise, yet it has been a drawback to the growth of garment making enterprises and textiles industry in Kenya.

 The importation of new ready-made garments has also affected the garment industry. The city center is densely populated with stalls selling ready-made apparel and accessories. Imports are from Turkey, China, United Kingdom, Dubai, United States of America, Korea, Thailand, India, Pakistan, South Africa and others.

This study sought to investigate the effect of adoption of silk materials by garment makers, in Nairobi, Kenya. Also, the study established the influence of cost of production of silk on the adoption of silk raw materials in to determine the impact of skills and competencies on the adoption of silk raw materials. This is geared towards examining the influence of perceived benefits of the adoption of silk raw materials and to establish the influence of social-cultural attitudes and to propose a framework to interpret the factors affecting the adoption of silk by garment makers in Nairobi, Kenya.

The study population comprised of fashion designers and tailoring units, in Nairobi Central Business and its environs. The sample of the study was 54 Garment shop owners and two case Studies at Gramwa Hand crafts and Kiko Romeo. Primary data were collected through the administration of the questionnaires. The data and information obtained through the questionnaire, interviews, and observations were first checked for completeness. Data gathered from correctly filled questionnaires was coded, tabulated and analyzed using SPSS by both descriptive statistics which included mean and standard deviation to capture the characteristics of the variables under study and inferential statistics which include regression coefficient which was used to analyze the relationship between the dependent and the independent variables.

Editing and coding was used to give a clear picture of the targeted objectives while frequency distribution enabled the researcher to meaningfully describe the distribution of measurements used as graphs and charts. This analysis enabled the researcher to show the effect of adoption of silk materials by garment makers, in Nairobi, Kenya. Based on the findings above, the study concluded that cost of silk, technology, skills and competence, perceived economic benefits and social-cultural attitudes greatly influenced the adoption of silk material by small-scale garment makers. The study

recommended that Silk reeling units should be adopted in the counties which have sericulture farms and at least one weaver's training centers should be opened having free training facilities.

1.2 Problem Statement

Lack of incentives for local cotton farmers leading to continuous closure of the textiles industries. This has tremendous negative impact on Kenyan garment making enterprises since almost all the raw materials, trimmings and accessories have to be imported. This has rendered the local industry to depend entirely on imported raw materials (fabric, yarns and fibers).

The use of synthetic (polyesters and spandex/ stretch) raw materials is on the increase, and yet they are hypo-allergic and have a low moisture regain.

The importation of new ready-made garments has also affected the garment industry. The city center is densely populated with stalls selling ready-made apparel and accessories. Imports are from Turkey, China, United Kingdom, Dubai, United States of America, Korea, Thailand, India, Pakistan, South Africa and others.

Second-hand/Recycled / (mitumba) clothes has also interfered with garment industry, especially when it became commercial rather than clothing for the poor.Second hand trade occupies 17%, new ready-made 32%, locally manufactured 14%, customer-tailored 37% of the apparel trade in Kenya, (Imo B. E and Maiyo R.C.).

Second-hand clothing is the second largest employer of mostly women and minority groups. This is because of the accessibility, reliability, competence, awareness, liability and most of all, affordability. But more notably is the fact that second-hand clothing traders are not innovative due to readily available merchandise, yet it has been a drawback to the growth of garment making enterprises and textiles industry in Kenya.

Utilizing silk through horticulture using mulberry plants (sericulture) may be a good alternative; garment makers can benefit by using more sustainable and locally available raw materials (fibers, yarns, and fabrics).

1.3 Objective of the Study

To establish the factors that may influence the adoption of silk raw materials by garment makers, in Nairobi, Kenya.

1.3.1 Specific Objectives

i.   To investigate the influence of perceived economic benefits of the adoption of silk raw materials.

ii. To investigate the influence of social-cultural attitudes on the adoption of silk raw materials

iii. To establish the effect of other substitutes (natural and synthetic fibers) of silk on the adoption of silk raw materials

iv. To examine the effects of skills and competences on the adoption of silk raw materials

v.   To propose a framework to interpret the factors affecting the adoption of silk by garment makers in Nairobi, Kenya.

1.4 Research Question

What are factors influencing the adoption of silk raw materials by garment makers, in Nairobi, Kenya?

1.4.1 Specific Research Questions

i.   How do perceived economic benefits of silk influence its adoption?

ii. How do social-cultural attitudes affect the adoption of silk raw materials?

iii. Do other substitutes (natural and synthetic fibers) of silk affect the adoption of silk raw materials?

iv. Do skills and competencies affect the adoption of silk raw materials?

v.   How can the the framework model interpret the factors affecting the adoption of silk by garment makers in Nairobi.

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1.5 Scope of the Study

This research interviewed 54 garment makers in Nairobi Central Business District and its environs, ten consumers and two case studies at Gramwa Handcrafts in Kiambu and Kiko Romeo in Yaya Centre. These two enterprises were selected because Gramwa is small scale and Kiko Romeo is high end for the comparative approach in addressing the reasons which hinder the growth of garment making enterprises in Nairobi Central Business District and its environs and how local natural fabrics such as Silk raw materials can enhance growth and sustainability in the sector. This was done through research questionnaires, photography, and observations.

The research was also carried out at National Sericulture Center, Thika (Kenya Agriculture and Livestock Research Organization), Sericulture initiative in Thika and at the International Center for Insects Physiology and Ecology (ICIPE) and further looked into groups formed to grow silk and mulberry plant farming such as Tuinuane Youth Group in Imenti South; a vision of reviving the textiles industry in the area which collapsed with the Gaitu Cotton Ginnery in Lower Imenti South.The researcher also researched on projects in Nyando, Nyamira, Homa Bay and Migori District.

1.6 Assumption of the study

   i.   The study assumed that all the respondents were aware of the availability of silk locally.

   ii.   Furthermore, the study assumed that all the respondents were aware of the existence of other substitutes (other natural fibers and synthetics).

1.7 Limitations of the Study

Possible inadequate information gaps during the administration of questionnaires: Concept that those interviewed hold against research; that the researcher needs the information for money making purposes. Information concerning financial areas may remain confidential and therefore give inadequate information for data analysis. Some respondents were also too busy for the research inquiry. Funding for travel to the centers for data collections was also a constraint.

1.8 Delimitation of the Study

The study was confined to investigating issues that affect the adoption of silk raw materials by garment makers in Nairobi, Kenya.

1.9 Justification

From the findings, a decision-making framework model to support the local textile industry was developed with the intention of improving production of the garment sector through the availability of local fabrics and raw materials in general. The needs of all stakeholders were incorporated in the design and production processes, consumption of the same will be guaranteed. This will enhance the adoption of silk by garment makers in Nairobi, Kenya. This study is relevant to the current debate on the sustainable textiles raw materials, yet silk has been underutilized in Kenya. The study addressed issues such as benefits that silk offers in the medical outfits and linens, (lingerie, anti-aging pillows, and biomaterials for eczema allergies, medical sutures and disposal cups).

Locally available silk will be utilized by garment makers to reduce the importation of raw materials by garment makers in Nairobi, Kenya. There will be an Improvement on the textiles raw materials and awareness of the benefits that come with silk utilization. There will be an improvement on the factors influencing adoption of silk for sustainable growth by garment makers in Nairobi, Kenya. Gross Domestic Product will improve in Textile industries; it is at 0.6% for homemade textiles products and 7% in the imported textiles. Working with locally produced raw materials such as silk will create value chain:

Farm – to - factory-to- manufacturing-to- Designers/garment makers-to- Retailers-to-consumers. The importation and usage of second-hand clothes (4000 containers every year) will go down. Through East Africa Community, secondhand garments are being faced out in three years, and this will give Kenyan Garment Makers an opportunity, through industrialization policy for vision 2030 to export more through AGOA. This was proposed by Industrialization PS Wilson Songa in January 2014.Silk is available locally and can be harvested three times a year. Also, it is globally viable due to the high demand by the international market, (Kasina M, 2015). Silk production in Kenya

is non-existent; the country still has the potential of getting into the international market.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter aimed at providing knowledge to previous literature and theory related to the textile industry. Therefore, this chapter conglomerated the literature which has already been debated on the issues of factors influencing the adoption of silk raw materials by small-scale garment makers. The study specifically covered the discussion on existing and published information on Textile Industry around the world and in Kenya. The researcher used integrative literature review type and organized the literature using thematic review of the literature. The topics in this chapter were theoretical framework, empirical, discussions, conceptual framework and model, production and processes of silk, technological influence, social cultural factors, skills and competencies, as well as, substitutes of silk, policies and policy makers, research Centers (ICIPE, KALRO), Institutions, suppliers, consumers, markets and organizations dealing with silk and research gaps.

2.1 Micro and Small Enterprises in Kenya

Kenyan industrial development and job creation are also supposed to be seen in garment making firms, but this is hindered by simple or "poor technology to produce basic, often low-quality goods for the domestic market (Abuodha & King 1993; Macormic, 1993). They stagnate and stay small. Small-scale businesses (SME's) can be both formal or informal sectors and are classified into farm and non-farm. The National Micro and Small Baseline survey in 1999 adopted this and is also in the new policy document (Ministry of Labor). Available statistics states that SMEs sector comprises 2.6 million Jua kali operators, 2.5million street traders; contributing to 18.4% to Gross Domestic Product (Ministry of Labor). Micro and Small Enterprises also referred to as 'Jua Kali' in Kenya means 'hot sun' in other words; informal or non-formal sector. The average Kenyan SME employs 1-6 workers while over 70% employ only one person. Although the flow of information on SME's Markets has slightly improved, many do not know where and how to access existing and relevant marketing information. This results into relying on informal feedback from customers.

As observed, small and Micro Enterprises (SMEs) in garment making in Kenya do not grow into large scale as seen in China, America, Europe, and some West African countries. The objective of the study is to research on reasons for this stagnation. The design of the research aims at revealing the aesthetic, functional, social and cultural significance of our textile materials and finished products as one method of addressing the above problem. The study further endeavored to reveal reasons why Kenyans prefered the imported textile materials and products; how to curb this by improving on the locally available materials such as silk supported by Kenya Agricultural Research Institute (K.A.L.R.O) and ICIPE research Centers. The study identified possible ways of sensitizing Kenyans to buy their own locally produced merchandise ('buy Kenya, build Kenya'). In the analysis of data, Kenyans' lifestyles, social-economic and cultural factors were reviewed. When analyzing material culture, ideas such as traditional, aesthetic concepts and design patterns were be researched on. This was observed in the end products of the fiber in the study. Materials used, occasions and even the financial status were other factors for consideration. The types of raw materials or fibers (natural and synthetic/ other natural fibers) were an essential point of discussion.

2.2 Garment Industry in Kenya

Garment industry in Kenya have been affected drastically by the continuous closure of most of textiles mills. This is because of inadequate textile raw materials due to climate changes as a result of Global Warming. There has been need for research on fibers, yarns and fabrics (raw materials) that are affordable, accessible and sustainable throughout the year. The cotton industries in Kenya went down from 52 Mills in 1984 to 15 central textiles mills, rendering the sector to importing expensive natural and synthetics raw materials. This has affected the growth of garment enterprises in Kenya, and yet it has the potential of creating jobs for a lot of unemployed Kenyans. There is a plan to revive Rivatex and Kikomi factories by the government.

According to research done by the African Cotton Textiles Industries Federation (ACTIF), local textiles capacity is at 45% of manufacturing market demand. Recycled and new imported clothes occupy 37% in various markets in terms of performance. Textiles products demand is rising annually at 3.8%.

In Sub- Saharan Africa, Kenya is third in position in importation of second hand clothes and accessories, after Tanzania and Ghana. Second-hand clothing trade occupies 17%, new ready-made 32%, locally manufactured 14%, customer-tailored 37% of the apparel trade in Kenya, (Imo B E, Maiyo R, 2012). Exporters of second-hand clothing to Kenya are United Kingdom, Canada, United States of America, Italy, Dubai, and Germany. Gikomba and Toy market is known for the second-hand markets in Nairobi. Kibuye market is known for second hand clothes in Kisumu; the residents still find the merchandise expensive. To help revive the garment industry, industrialization PS Wilson suggested a ban on second hand (Owiti, 2014). This year the Kenyan Government through the Parliament and President Kenyatta declared the ban on second-hand clothing in three phases (Equity,2016, The Kenyan Textile and Fashion Industry Report). Second hand clothing is second largest employer of mostly women and minority groups. This is because of the accessibility, reliability, competence, awareness, liability and most of all, affordability. But more notably is the fact that second-hand clothing traders are not innovative due to readily available merchandise. This has been a drawback to the growth of garment making enterprises in Kenya. Second-hand markets contribute to the demise of the local textile and fashion industry, over the years (Nyang'or,1994, Elun'ata,2003, Maiyo and Imo, 2012).

Garment Makers need to improve the quality of Kenyan made clothing to meet the international standards (Kenya Bureau of Standards). Kenyan made apparel are faced with poor color fastness, artistic finishing, shrinkage, artistry, labeling, and imitations, (Imo B, 2012). Consumer protection Service and Clothing Market Policy should ensure adequate clothing production standards are maintained, (Otieno, 1990). The report on the performance of Kenyan Fashion and Textile industry revealed that it had remained too disperse and fragmented. This is because there is no correlation between those outside EPZ and EPZ. This is due to the fact that the raw materials, and fashion products available are not within the export standards.

Table 1: Second Hand Clothing (Mitumba) Consumption in Percentages

Country	Weight (Kg)	Consumption per capita (kg)	Estimated no. Of garments	Estimated no. Of traders
Tanzania	48,932,746	1.375	195,730,984	90,616**
Ghana	41,270,997	2.064	165,083,988	76,428**
Kenya	38,568,416	1.240	154,273,664	71,423**

Source: UNT Trade Statistics - UTGLWF, 2003

2.3 Sustainability

Sustainability has three pillars and four facets or elements namely, culture, social, economic and environmental development. There are seventeen global goals or Sustainable Development goals that transform our world built on the Millennium Development Goals (MDGs). They affect areas such as industry, life on land and water, climate action, clean and affordable energy, responsible consumption and production, reduced inequality, sustainable cities, industry innovation and infrastructure, good jobs for economic development, equity, good health and poverty eradication (Global Silk Industry, 2013).

Since 2017, Eco-design has developed considerably, with the increase in awareness of environmental issues in the industry. The approach formerly was to reduce wastes and pollution after being generated instead of pure manufacturing methods, material choices and how to disposal items. This ensures less waste and pollution generation into the environment. Ecological damage is caused by present population levels, production and consumption patterns. Three areas of concerns are air, water, and land contamination, (MacNamara,1992). Environmental problems may be mitigated by using natural dyes instead of toxic synthetic (Ibrahim A U, Mohammed N, Wong Y C). Given this sustainability discussion, there is need for raw materials such as local silk which offer value chain from farming to textile and garment industries. Silk is eco-friendly and safe natural dyes may be used to create employment and promote export earnings in farming, textile and fashion industries. (Ampiah et al. 2014).

2.4 Silk Globally

The main producers of silk are China, Japan, India, Brazil, Uzbekistan, Republic of Vietnam, Korea, Thailand, DPR, Iran, Korea, and others. There are some countries that produce silk cocoons in smaller amounts, Kenya Botswana, Japan, Nepal, Bulgaria, Turkey, Uganda, Malaysia, Egypt, Nigeria, Zambia, Zimbabwe, Romania, Bolivia, Bangladesh. Kenya can be among the global producers if it can increase its capacity by venturing more into this sericulture endeavor (International Silk Commission, 2013).

Table 2: Global Silk Producers

Country	2010	2011	2012	2013	2014	2015
Bangladesh	40	38	42.50	43	44.5	44
Brazil	770	558	614	550	560	600
Bulgaria	9.4	6	8.5	8.5	8	8
China	115000	104000	126000	130000	146000	170000
Colombia	0.6	0.6	0.6	0.6	0.5	0.5
Egypt	0.3	0.7	0.7	0.7	0.82	0.83
India	21005	23060	23679	26480	28708	28523
Indonesia	20	20	20	16	10	8
Iran	75	120	123	123	110	120
Japan	54	42	30	30	30	30
North Korea	-	300	300	300	320	350
South Korea	3	3	1.5	1.6	1.2	1
Philippines	1	1	0.89	1	1.1	1.2
Syria	0.6	0.5	0.5	0.7	0.5	0.3
Thailand	655	655	655	680	692	698
Tunisia	0.12	3	3.95	4	4	3
Turkey	18	22	22	25	32	30
Uzbekistan	940	940	940	980	1100	1200
Vietnam	550	500	450	475	420	450
Madagascar	16	16	18	18	15	5
Total	**139100.02**	**129661.80**	**152845.64**	**159737.10**	**178057.62**	**202072.83**

Source: International Silk   Commission, 2013

The table above shows global silk producers. Countries that consume silk in greatest amounts are Japan, Italy, China, India, United States of America, France, United

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Kingdom, Germany Switzerland, UAE, Vietnam, Korea, and others. Silk percentage of global textile market is estimated at about 0.02, but it cannot be verified due to the fact that silk end products are not clearly defined. The Production of silk extends into about 60 countries worldwide, but Asia produces about 90% of wild and domesticated silk, it engages about 7.9 million employees in India. There are about 20,000 families engaging in weaving of silk fabrics in Thailand and in China, there are about 1million employees. The largest world producer and supplier of silk is China, followed by Indian. Sericulture needs very little funding, yet it generates raw materials for textiles industries and alleviates rural- urban movement. Japan was the leading exporter of raw silk because it had advanced technology and protectionist market policy, but this was challenged in the 1970s. This is because synthetics fibers gained more favor and Japan had also lost the protectionist policy. Around 1975, it ceased to be the world's most exporter of silk.

2.5 Africa Silk Industry

International Center of Insect Physiology and Ecology (ICIPE) together with Master Card Foundation, have been supporting Ethiopia in silk and bee farming at Oroma, Tigray, and in the southern part of the nation. This has been achieved through funding consisting of 31 million dollars financing and empowering the natives, youths with education and employment as early as 2010. Early 2016, ICIPE and Master Card Foundation announced a 10.35 million dollars (about 220 Ethiopian Birr). The focus is on the peri-urban and rural youth for sustainability through income generation. The project also supports women. The project combines expertise on insects with funding to empower youths.

In Ghana, Garment and Textiles industry is dominated by 90% women who are also owner-entrepreneurs and employees. They are described as clothing designers and seamstresses. Most Garment and Textiles businesses here comprise a work of 9-25 employees. They are managed by self-made entrepreneurs and often clustered together in the urban centers (International Forum On Sustainable Private Sector, (Dr. Afua A. Kufor Ph.D. Gimpa Business School, Ghana). SME's contribute about 85% of manufacturing employment and accounts for about 92% of businesses. Ghana Statistical Service (GSS) considers firms with less than 10-employees as small-scale

enterprise and those with more than 10-employees are categorized as medium to large.

The President's Special Initiative (PSS) on Garment and Textiles is a government of Ghana intervention to support the private sector investment. It was launched in September 2001 as a public-private partnership programme designed to develop new pillars of growth for the Ghana economy.

Ghana is known for kente cloth which was first developed by the Ashante people dating back to 3000BC.It was woven in cotton and silk from Europe and Asia, but today also it is woven in rayon and woven in Lurex and Spun Rayon. Kente was reserved for the royal and wealthy, but today it is worn by all social classes; it is one of the world's revered textiles. Silk yarns are considered the most prestigious and are therefore the most highly valued.

The value of Kente can be increased by blending it with African Silk to offer designs characteristics to only the African Sub-Saharan- with the aim of attracting the large export market both locally and internationally, (Fening O, 2006).Ghana is one of the 37 Sub-Saharan African countries under AGOA, which enables duty-free entry to United states Market. It is the founder of trade and investments policy towards Sub-Saharan Africa.

Sericulture has a history of 30 years in East Africa. Conditions in each country have not been satisfactory due to underdevelopment of silk reeling technologies in sericulture. The East Africa Community for vision 2030 has shown similar challenges; importation of secondhand clothing, imports from China, India, and others, resulting in 0.6% of GDP and 7% of the exported textiles products in the country.

2.6 Silk Production in Kenya

Silk Farming(sericulture) was started in Kenya in 1972 by the Government in conjunction with the Japan International Cooperation Agency(JICA). Kenya is suited for sericulture due to the favorable climatic conditions. This enables mulberry (silk worm feeds) farming, hence and rearing of the silkworms. The success of Sericulture has impediments such as inadequate technology in production and processing cocoons

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into silk raw materials. JICA, Kenyan Government and silk Centers (ICIPE and KALRO) have been working together to improve sericulture in Kenya.

Global raw silk is decreasing, giving Kenya an opportunity to engage in this market. This may be achieved through mulberry farming, (silkworm feeds) for production of high-quality cocoons. Since silk is underutilized, Kenya needs to venture and explore on this and take advantage and engage in the sericulture activities and the end products such as the fibers, yarns and fabrics, apparels, accessories, and upholsteries. Sericulture was declared an agricultural activity in 2015 and is now recognized by Ministry of Agriculture, yet there are challenges such as the inadequate supply of silk, poor quality due to inappropriate and old methods. This leads to high pricing of silk materials and weaker marketing channels and skills. This may be rectified by more sericulture activities or engagements. The Government of Kenya and Japan are facilitating the organizations and institutes with the reeling machines, but it is not adequately explored by Kenyan silk farmers. Utilizing this technology may improve the quality of silk products for export market. The demand for silk is there, but Kenya is lacking capacity: the demand for silk is higher than the world capacity by 12%. The global demand is rising but production is decreasing (Bafana, 2009). World production stands at 80,774 Tons (Gaddum, 2006, Srinivasa et; 2005).

Also, there is lack of studies and research to evaluate the properties of raw silk and fabric produced by the available Bombyx mori strains available. Silkworm rearing and mounting practicing would be enabled, resulting in the quality production of cocoon and silk fiber and fabrics. This would allow Kenya to compete in the international, regional and local market. Kenyans prefer the imported textile materials and products, and this has also been a drawback to the garment and Textiles industry; this may be improved by using the locally available materials such as silk supported by Kenya Agricultural Research Institute (K.A.L.R.O.) and ICIPE research Centers. In Kakamega (Ikolomani sub-location), Emily Bunoru continues to rear silkworms and makes double profits of maize farming; it is less susceptible to unpredictable weather, uses less energy and gives a steady income; report during JICA visit and installation of a reeling.

2.6.1 Silk Market Outlets in Kenya

  i.   Spin weave in Nairobi

ii.   Gramwa in Kiambu

iii.   Mwingi silk market, in Mwingi

iv.   Arabuko, Sokoke silk market in Malindi

v.   Molo weavers in Elburgon

vi.   Rivatex Limited in Eldoret (prospective large-scale buyer)

vii.   Kimahuri youth group in Nyeri County

viii.   Sarah Jane in Nairobi

ix.   Seritex Company , in Meru

x.   Tuinuane Youth Group in Imenti South, Meru

Table 3: Areas practicing Sericulture in Kenya

Nyanza Province	Homa-Bay, Bondo, Rachuonyo,
Western Province	Busia, Budalangi, Kakamega, Emuhanya, Ikolomani
Rift Valley Province	Rongai, Wavengi, Naivasha, Laikipia, East & West Nakuru, Kajiado
Central Province	Kikuyu, Lari, Kiambu, Ruiru, Murang'a, South & East, Kirinyaga, Nyeri West
Coast Province	Kwale, Malindi, Tana River, Taita Taveta
Nairobi Province	Kasarani,

Source:Ngoka, 2012

2.7 Silk institutes and Organizations in Kenya

The following are the silk institutes and organizations in Kenya

2.7.1 International Center of Insect Physiology and Ecology (ICIPE)

International Center of Insect Physiology and Ecology(ICIPE) was founded by Pro. Odhiambo in the 1990s. The Director-General is Dr. Segenete Kelemu.The sericulture department coordinator is Dr.Nguku E .and the department operations are enabled by

Dr. Ngoka B. The mission was poverty alleviation, ensure food security and overall health status improvement, through development and extension of appropriate technology in Global Science in entomology (harmful and useful insects/pests) and capacity building for the preservation of natural resource base through research.

The vision of ICIPE is to initiate research on entomology globally, raise health standards of people and environment. It does this by researching and acting on the ever changing environmental issues that affect the living standards of the people. At ICIPE the research carried on the useful and pests; the latter cause water scarcity, land degradation, and poor soil health. The healthy insects provide biodiversity to weak and marginalized areas through beekeeping and silk rearing in Africa. ICIPE is a research Center that is fully equipped with technology; that enable scientists in full capacity. Below is some equipment in sericulture department.

Figure 1: Power loom for reeling and silk threads on bobbins at ICIPE

Source: Author, 2016   Source: Author, 2016

Figure 2: A wooden manual Hand spinning wheel and Silk yarns at ICIPE

Source: Author, 2016   **Source, Author, 2016**

Raw silk is either reeled or spun to form yarn.spinning is performed manually using the wooden manual hand spinning wheel.Reeling is done by the use of a powerloom.

2.7.2 National Sericulture Research Centre (KALRO)

National Sericulture Research Centre is within Kenya Agriculture and Livestock Organization (KALRO) in Thika, Kenya. It is headed by Dr. Muo Kasini, an Entomologist. According to him, Local Research Sciences work with the National Institute of Agrobiological Sciences of Japan and United Kingdom Firm, Oxford Biomaterials to identify silkworm's strains and mulberry varieties that thrive in the country, (Kasini M, 2016).

According to Dr. Felister Makini, Rural women and youths are empowered by projects involving local mulberry farming. The latter has an economical value chain involving the farmers and consumers. Mulberry fruits are sweet and aromatic and perfect for jam and juices. The leaves are dried into a powder and can be used in foods and drinks to lower blood pressure and stress.

Figure 3: Silk yarns and Bobbins for winding fibers from KALRO, Thika

Source: Author, 2015   **Source: Author, 2015**

2.7.3 Tosheka Textiles

"Eco-innovation: Tosheka textiles take on sustainable supply and production".

Figure 4: Eri silkworms and Cocoons from Tosheka Textiles

Source: http://www.tdsblog.com/wp-content/uploads/2016/06/Tosheka-silk-worms

Tosheka Textiles was started in 2011, by Lucy Bingham in partnership with her husband, Herman Bingham. It is situated in Makueni having a community of 200 members. It specializes in green textile production that is holistic, environmentally friendly to facilitate fiber to fashion. They work with recycled materials, natural fibers, and eco-friendly dyes. The owners being textile designers engage in agro-business and gets its supply locally (90% of their ware is locally produced). They use cotton, silk, sisal and also work with the recycled material to make bags. They do printing and dyeing then turn them into fashionable products. Further, the owner has a degree in design and Business analysis from the United Kingdom. They buy the cotton from farmers.

Tosheka Textiles uses Eri silkworms as seen in figure 4. They train farmers on the production of Eri Silkworms (sericulture); creating standards of operations and procedures, how to rear them and do in quality control. Monitoring the quality has done a lot regarding producing high-quality fibers by using the Eri silk. The worms reproduce very fast. Each worm (adult butterfly) lays not less than 300 eggs. Tosheka targets a community of 3,000 people with monetary assistance from the African Enterprise Challenge Fund (AEC), used to help promote silk production with the farmers. Each was working with four groups containing ten members, dealing with silk production. Tosheka and the group have wide a knowledge in sustainable design. They exhibit high standards in producing textiles products using natural fabrics by eco-friendly methods. Kenyan culture is preserved by allowing the artisans to use

local cultural crafts for their artistry. Textiles can create a sustainable community and economic empowerment.

2.7.4 Mwingi Weavers

There are 2 Hectares of land containing 1000 Acacia trees with wild silkworms in Mwingi. One tree can support up to 200 silkworms which yield 200,000 cocoons. There are two harvests in March-May and October-November. The total produce is 400,000 cocoons per hectare per year. The resultant economic/financial benefit is eight people, 118,725 Kenya shillings per year.

2.7.5 Ikolomani Kakamega

Silkworm experts set sights on Kakamega (Ikolomani Sub-County), (Linet Wafula, Nation paper Nation paper,30th Oct 2016). Non- governmental organization was believed to have collapsed after farmers 'shunned it', but Ms. Emily Bonoru from Ikilomani still keeps silkworms. There are also social-cultural attitudes that have made some farmers to abandon sericulture. A Japanese team led by Dr. Mokoto Kiuchi an expert in silkworm rearing and breeding promised to help Kenya develop a suitable silkworm breeding, silk training carried on how to rare high-quality fiber for both domestic and export markets. The agreement was signed by the National sericulture center and Japan International Cooperation Agency (JICA). Dr. Muo Kasini, Director of Sericulture Centre, Thika said that 24 Counties in the country had the potential for silk production. He said that farmers should embrace sericulture due to its ready market.

2.8 Policies Governing the Kenyan Silk Industry

There is international, regional and national policy environment in Kenya for the last 20 years which have impacted or affected the Textile industry (KIPPRA, 2014). These Policies which Kenya Textile Sector Industry has continued to perform are:

2.8.1 African Growth and Opportunity Act (AGOA)

African Growth Opportunity Act (AGOA 2000), was founded by United States Congress to make provisions for economic strategies and to improve the conditions of the textiles industries in Sub Saharan Africa (ACTIF, 2013). This act was enacted by

US Congress to uplift areas such as trade and investments to build trade relations between United States and Africa Nations meeting eligibility criteria for democracy, economic openness, and good governance. The merchandise that qualify the export market from African Sub-Saharan Countries is expanded by AGOA. These countries are allowed by AGOA initiative to import at a duty free, through Generalised System Preferences(GSP) 4600 products, while AGOA 6400 products. Kenya has a vast opportunity to raise its capacity and quality of exports through AGOA Initiative in areas such as the textiles, agricultural products (coffee, flowers, pyrethrum, Honey and tea).

In May 18th 2000, United States of America Senate passed AGOA Act that allowed exports to the United States of America market, goods of apparel duty-free without limitation. The Export Promotion Zones companies expected to gain from the free trade offered to Kenya in Textiles under this free duty trade. AGOA has since been renewed to 2025. Other products with massive potential in United States Market include Handicrafts and leather products. The small-scale industries can explore into this to penetrate the international market. This enabled Kenya to be among the first exporters in 2001.

2.8.2 East African Community (EAC)

In East Africa there are over 60 wild silk moth species yet, this high potential is not fully utilized by the natives. Wild silkworms can act as an alternative farming to subsistence farmers. This has been evident when Kenya participated in trade and industry liberalization policies. The East Africa Community (EAC) was re-established through the signing of a treaty in 1999, and this came into effect in 2000.It is made up of five Partner States: Kenya, Burundi, Rwanda, United   Republic of Tanzania and Uganda.

2.8.3 African Cotton and Textiles Industries Federation (ACTIF)

Former Prime minister, Raila Odinga and Fashion Designers Stakeholders launched ACTIF to revive the cotton production industry. Its intended to reverse textiles sourcing from outside Africa by ensuring that the fabric, design, and fashion (entire value chain) originate directly from this continent. Designers from Kenya, Uganda, Ethiopia, and Tanzania were represented. In 1901, cotton was elevated to a cash crop.

This is due to the fact that Kenya has ample lands with capacity of 2.04 million Hectares of lands; (350,000 Hectares, rain fed and 35,000 Hactares for irrigation) for cotton production. Areas suitable for cotton production are Coast, Nyanza, Western Province and Rift Valley.

Bura and Hola Irrigation Schemes used to give harvest worth 40% of the total production output. These irrigation schemes have been going through revival to enhance the cotton production. But the Textiles Industry is still facing challenges in the supply of raw materials. Farmers in Kenya may achieve more yields if they work in groups which can enable them in area of interests including finance and policy makers. Other industrial–oriented policies initiated by the Government of Kenya include: Export Promotion Council, Manufacturing Under Bond (MUB), Export Processing Zone Authority (EPZA) and others. The apparel business still has an upper hand in EPZ. The Enterprises occupy 29%, the local jobs present 78%, sales amount to 52%, while private businesses occupy 30%.

Kenya, among other SSA Countries, was ranked as the leading exporter into United States Market under African Growth Organizational Authority with shares of 31.6% and export value of US$ 261 Million (Policy Research, 2013). However, the success of the garment industry which to a large extent has foreign affiliation has had practically no direct effect on existing textile mills in Kenya. The local mills have not recorded a correlated growth, the main reason being that they do not supply fabric to the garment factories that export to the US under AGOA. Fabric sourcing as a raw material is a critical factor in textile manufacturing for export. There is no correlation between textiles manufacturers, garment producers and processors in the value chain. This is as a result of importation of raw materials. Trickle effect is lacking to the farmers in textiles sector. (ACTIF, 2013). The industry remains too dispersed and fragmented; EPZ needs to link up with other operators outside it to complete the value chain. The Value-Addition path in this industry chain comprises of: (Cut, Make and Trim), Original Equipment Manufacturing (OEM), Original Design Manufacture (ODM), Full Package Service Provider (FPSP), Original Brand Manufacturing (OBM), Haute Couture ((HC). The Kenyan garment sector may emulate the Mauritanian Integrated industry for economic growth. In 2030 millennium goal.

2.8.4 Department of Micro and Small Enterprise Development

Micro and Small Enterprises deal with 'Jua Kali' Sector to form and implement policies of the sector.The department was established in 2002 to oversee the implementation and coordinate programs and strategy for SME sector. It comprises Jua Kali Artisan in manufacturing and services, small traders, and vendors both on the farm and nonfarm enterprises. It is evident that it is the only sector in the economy that has proved capable of providing immediate employment opportunities to ever-expanding Kenyan population, employing 75.2% of the total labor force.

The Human Resource Management and Employment department have the following responsibilities:

i.   Provision of labor market information

ii.   Monitoring of employment trends

iii. Administration of foreign employment agencies

iv.   Formulation of National policies for manpower planning, development and employment

v.   Development of strategies and programs for employment creation

vi.   Guidance counseling and placement of job seekers.

vii. National Jua Kali Exhibition and Marketers

This association enables SMEs; in other sectors and textiles(including silk marketers and producers) to exhibit their wares all over East Africa at local and international trade fares and exhibitions. This provides a ready market for members. It is therefore relevant for the artisans to register with such associations to market and sell their wares.

2.9 Determinism Theory and Adoption of Silk

Technological Determinism concept sees the effects of technology as the principal determinant of cultural change. Technology drives and inevitably defines cultural change. Technology has effects that are the determining factor responsible for the cultural change. The approach applies advance technology in the areas that need

social change in behavior for stability. However, it does not address social-cultural factors. (Croteau & Hoynes, 2013).

Technological determinism shows technical developments, technology, or media, as a whole, as the critical determinant of social change and history. Technological determinism interpretations share two ideologies; that technology development indicators are precious and can be tracked not as in the case of political and cultural factors. For Technology development is not anchored on social conditions, rather on societies that support and adapt it easily.

2.9.1 Cultural Determinism Theory and Adoption of Silk

A cultural deterministic view states that a culture causes technology to expand, thus helping us become more efficient with tasks. Cultural values, desires, and practices help establish a change in technology, ultimately impacting the community of people. It is the community (and their intent) that is to blame for problems, not the technology. Cultural determinism reflects a response that can only be reassuring of the developing technology. We must determine the effects of the technology desirable or not, and establish the impact they cause on society as a whole, intended or not. Cultural determinism requires that the, values, feelings, beliefs, and practices of the specific culture must produce a need for development of these technologies.

2.10 Skills and Competencies and Adoption of Silk Raw Material

Johnsen (2010) examined the role of local suppliers in strategic networks for internationalization from the standpoint of small-scale Italian and Thai silk suppliers. Multiple case studies of small and medium suppliers within the silk industries of Italy and Thailand were undertaken. Seventeen interviews and three observations conducted by directors and managers of silk suppliers and government agencies, institutes, and associations involved in the silk industry, identified significant current issues within the sector. Findings suggested that silk suppliers' networks may be coordinated by a focal supplier assuming the strategic leadership role. The participation of a focal and strategically-focused supplier may strengthen and integrate the resources and capabilities of silk suppliers in their networks enabling them to improve their international network development and positioning.

Mappiggau (2012) aimed to establish core competence and sustainable competitive advantage (SCA) of the small silk weaving industries in Wajo District and to formulate its roadmap development. Intellectual capabilities are required to develop knowledge, and operationalizing expertise is part of nurturing skills, all are prerequisites to developing competence, along with other social and attitudes. Factors that influence an individual's degree of competence are ability, knowledge, understanding, skill, action, experience and motivation (Weinert (2001: 29). The silk production process is one of the primary textiles cottage industries in Kenya. The enterprises are small scale, and so the incomes are low. The volume of production is low, technology applied is traditional. Modern technologies enable activities such as reeling cocoons before selling to fetch farmers more income, (Odhiambo S 2014). The middle-men buy the cocoons and sell to reelers at a higher price, exploiting farmers.

According to (Osanjo L S, 2012), Extension Services Model is a requirement by the entrepreneur to impart training and the stakeholders to converge to improve in MSE design skills and knowledge. High-end fashion is sustained by some economies including USA, Europe, and Asia due to enablement of raw materials, expertise, adequate skills and labor, quality of products, effective marketing strategies, consumer consciousness and continuous technological and managerial innovations; prompt production and purchasing, total quality management, process re-engineering, and capital-intensive production(Elung'ata,2003:Otiso, 2004: OTEXA,2001).Yet Africa, Kenya included, do not meet requirements such as state of the art design and management experience , investments levels and training in the fashion industry,(Oiso,2004: Maiyo and Imo 2012).

2.11 Social Cultural Attitudes and Adoption of Silk Raw Material

Chandima (2010) examined how culture can act as a spring board in uplift livelihood, researching on how cultural traditions may result into strategies that are adaptable in empowering rural communities and create opportunities during recessions. The findings showed how livelihood may be empowered through culture and traditions uplifting, while change can result from other influences and adaptation by application of dynamics within. Attitudes concern social and cultural so met Kar (2012) purposed to explain traditional knowledge management process of self-employed weavers. Social cultural factors are usually influenced by one's environment, thereby affecting

choice of clothing and purchasing decision. It is also determined by peers, family, church, community and sources of information (Migunda,1993). According to Imo E. B, Kenyan's social-cultural diversity result from over 40 Ethnic groups (tribes), each with their own symbols / traditions, (Rabine,2002).

2.12 Effects of Substitutes (natural fibers and synthetics) and Adoption of Silk

Substitutes or other alternatives which affect the adoption of silk include other natural or vegetable fibers (cotton, linen, hemp, coir, pina, sisal, kapok, ramie, and others) or animal fibres (wool, and hair fibres). These have physical characteristics for dyeing experiments considering easier administration and instant receptivity of dyes, (Mayienga J. S, 1987).

Natural fabrics are kente, batik, kuba cloth, Maasai shuka, kikoy, kitenge, tie and dye. Synthetics, also referred to as long-chain polymers (Nylon, Aramid, polyester, Acrylic, Moda-Acrylic, Spandex, Olefin, Saran, Novoloid, Fluorocarbon, Alginate, Anidex, Lastril, Nitril, and Vinal) are hypo allergic because their moisture regain is low (low in porosity and absorbency); hence not very healthy or comfortable in hot and humid weather as natural fibers. They are not bio-degradable as natural fibers because they are made from chemical solutions which are hardened into filaments. The international market is huge on the trend to go green; silk yarn is now being used to manufacture medical devices, high-end wigs and hardened to replicate iron (Mutungi T, 2015). To recognize the importance silk and other natural fibers, The United Nations declared 2009 international Year of Natural Fibers.

2.12.1 Kitenge

The kitenge is made out of cotton fabric and printed with wax by the use of rotary printing machines. Often, a dark wax print is used on a lighter background giving off a multicolored finish. The kitenge is made out of a thicker fabric in comparison to the kanga and produced in a variety of colors that represent and communicate culture, feelings and native African traditions. The kitenge is mostly worn during ceremonies and celebrations by wrapping around the waist, chest, as a headscarf or tailored into a dress. In recent times, the kitenge is used in the making of accessories such as earrings, shoes, necklaces bags, and bangles by wrapping the fabric around the

particular accessory. It is widely worn in West African, East Africa, DRC, Somalia, and Sudan. The natives of Malawi, Zambia and Namibia refer to it as *chitenge*.

2.12.2 Kanga/ Lesso

The kanga is a one-piece cotton fabric with a border on all four sides. It measures about 1.1m by 1.67m and is printed by silkscreen method for framing of the patterns. Unlike the Kitenge, the kanga is printed on a dark background with uniform bright colored patterns to prevent transparency. The kanga being a one-piece fabric is normally bought in pairs characterized by text print inclusions at the bottom of the fabric. The texts are used for communicating or expressing moods and feelings and they are mostly in form of a proverb, riddle, political slogans, flirtations or insults which mostly appear in Swahili unlike in the nineteenth century where Arabic was used instead. The kanga is worn by wrapping around the body or head or tailored into a dress. It is worn by women in East Africa particularly from the coastal regions. The kanga is sometimes referred to as khanga or lesso depending on the region.

2.12.3 Production of the Kitenge, kanga and kikoi

Before Kenya gained its independence in 1963, these fabrics were imported largely from Europe and India but in later years, the textile industrial sector became a core industry in development of the Kenyan economy with the Kitenge and kanga fabrics being produced by Rift Valley Textiles (RIVATEX). This largely reduced loss of government revenue attained from previous smuggling of the kanga from Tanzania.

2.12.4 The Kikoi (Kikoy)

The kikoi was originally worn in the East African coast by Swahili men; it is a wrap piece fabric made from 100% cotton and measures about 180 by 100cm. It is a multi-purpose fabric that can be used as a scarf or blanket to keep warm in cold weather, as a

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table cloth or seat cover (often used by Kenyans to cover up car seats), as a baby-sling, a towel or as a traveling blanket to keep cool during hot weather. The kikoi is also used in Tanzania to make folklore articles such as the traditional kikoi Boubou and the Mgolole (traditional shirt).

2.12.5 Maasai Shuka

This has its origin from the Maasai community. It is the main garment worn by the Maasai. It is used by both men and women and exists in various colours according to the occasion. The uses range from apparel to table and bed linen, shawls and accessories. The common colours are red, purple, blue and green blended with Black or other lighter colours in checks. Maasai men tie the shuka over each shoulder with a third one draped over the top. The Maasai shuka has been used in African contemporary design to for many uses as brand that portrays Kenyan and African culture.

2.12.6 Kente

Kente means basket because the original fabric was constructed using basket weaves. It was discovered by Kwaku and Ota Karaban in Bonwire Town, in Ghana. The inspiration was got from the spider weaving its web. Kente used to be to worn only by the royal people of the Ashanti

Source: Misati B, 2006

People at ceremonies such as weddings. It used to be made from cotton and silk. Today it has been made affordable for the common man by use of blends such as spun rayon and lurex. It is worn because of it is symbolic and beautiful, only associated with the Ashanti People.

2.12.7 Kuba Cloth

The "KUBA" raffia cloth is woven by Kuba people using beautiful fabric that is embroidered by raffia fiber and traded to neighbouring areas(Misati B, 2006).

Source: Misati B, 2006

2.12.8 Batik

Batik is a technique in which hot wax is used to draw on a fabric in the form of a design. Bee wax and resin and paraffin wax can be used to resist dye from penetrating fabrics or yarns where dye should not. The fabric is then dyed according to colour scheme, starting with light to

Source: Author,2017   darker colours. Batik technique is associated with Indonesian Textile Arts. For centuries Batik from Java has been perfected and refined to produce unique national treasure. A special tool called Tjanting is used by Javanese for drawing wax on fabric surface. It consists of one or two sprouts and a bamboo handle. The copper cup holds   hot liquid and the sprout allows the wax to flow in smooth line. Thickness of the line   is determined by the thickness of the hollow in the sprout. Techniques used are crackle, dripped, brushed, Tjap (blocks for stamping)

2.12.9 Tie and Dye

This is a resist dying method done by tying parts of the fabric tightly with yarns or strings or tied in knots at selected areas. The knotted areas are protected from dye penetrating them. The shape wrapping the placement of the tied areas do produce intricate and attractive patterns. Badana is an Indian name for tie and dye. Techniques used are, tritiks, marbling, samosa, pillars/ pyramids, sun

Source: Author, 2017

Dyes used for Tie and Dye range from vegetable, dylons and industrial (vat) dyes. Fabrics used depend on the dyes used (Cotton, silk, synthetics and wool). It is important to wash fabric with water and soap flakes to remove finish and dressing on most new woven fabrics. Materials Used to tie and bind areas of fabric to be resisted are: Clamps (paper clips or clothes pegs, bull dog clips),Pebbles, assortment of beans, coins, lentils (peas, rice) for intricate designs.Threads- plastic twine, raffia, elastic bands, string.

2.13 Production Cost Economic Theory and Adoption of Silk

Economic theory relates to the production cost. In normal situations, the firm buys raw materials(inputs) which it converts into products(outputs). It relates to two markets: purchasing raw materials for production and supplies goods and services. It adjusts its activities according to the customers' demand in order to make profits. Every firm has to decide on the employment of each input: capital, labor, land, materials, energy, services and products. The basic assumption made by the analyst relates to maximization of costs. Businesses are to undertake in this setting combined inputs in order to increase production. In order to achieve lowest cost output, hiring of factors for production for equilibrium is crucial. This implies that the firm will choose a factor combination or resource combination that minimizes the total cost of production.

The production cost economic theory informs on the study variable cost of silk. Small-scale garment makers are both a demander of raw silk materials in the factor markets, and a supplier of finished silk products in the markets for goods and services and their decisions in both markets are guided by the price levels. Gowda et al. (2012)

showed that Seri culturists solely adopt the available technology in their sericulture management, but the critical areas also require to adopt the technology to meet the demand. There is an urgent need to adopt specific modern and mechanized systems at all levels of sericulture activities. Some of the low-cost tools discussed in the study and tools developed by Japan, India, and CSRI, are recommended at various levels of sericulture activities. Findings suggest that sericulturists by making the best use of the modern low-cost tools in silk farming, pruning and mulberry harvesting and can enjoy a huge market not only domestically, but also globally.

Vasumathi (2012) observed that the industry has to break-even over a period to consolidate the gains, however small. So, it is profitable to study the economics of silk reeling industry over a sufficient period enough to include a cycle of seasonality, be it concerning cocoon availability, price, quality, raw silk demand or raw silk price. Also, uncertainties at varying points of time included in the study including their effect on reeling economics make the study more significant. Seasonality with respect to cocoon supply and demand dictates the variations in cocoon price over a period of time. Concerning the variations in cocoon price at a given season, the price differential between the cocoon lots is due to its quality. A study of the interrelationship between cocoon quality, its quantity and price as also raw silk price is important. The relationship between the cost of cocoons, its quality and its productivity analysis is realistic when the determination of reeling economics is built upon it. A study of a typical reeling unit, to unearth the intricacies of operations and decision-making in the light of the volatile situation in the industry forms a prerequisite for a clear understanding of its functioning.

2.14 Perceived Economic Benefits of Silk Raw Materials

Diab et al. (2010) highlighted the technicalities of rearing silkworms and cocoons production with regard calculation and assessment of financial indicators of the viability of establishing such projects and analysis of occurring changes or threats to the viability of the projects. The financial analysis showed high positive net present value of the net profit over the twenty years' project life, with revenues significantly exceeding the capital and operating costs, and a high IRR. Benefit of the previous indicators present high profitability margins. Though small, the project is sensitive to

change in revenues and *costs*. Relatively,Sericulture project has a small period of payback.

Bonneto et al (2014) focus of study was how lacking investment in innovation and specific business culture lead to situations where disadvantages take a cumulative character which strengthens the process of decline of economic competitiveness and loss of market shares. In the case study about the life-cycle of the French silk industry and its related entrepreneurial activities in the area of textile design in the city of Lyon, it was illustrated how a lack of innovation related with a specific entrepreneurial behavior is leading to a collapse of the whole sector, which, until the 1970's, occupied a world-leading position in this field. The case study was based on interviews with experts and actors involved in this business, witnesses to the activity's collapse, on desktop research and the study of documents which analyze the evolution to the currently existing situation. Presently, only isolated persons continue on a free-lance basis the traditional activity, most of them close to retiring age. A few companies, with significantly reorganized activities, do as well continue their activity.

In Kenya, over 600 farmers are involved in silk, but production is less than 2 tons of dried cocoons, while the national potential is over 10,000metric tones. Silk commands respect because it has been in use for for many centuries due to its many unique properties. It is ranked as the highest priced natural fiber, (Nguku K. E, 2012). In her research, it has been revealed that there are six selected silkworm strains being studied to evaluate properties of silk fiber, fabric and cocoons produced by the BombyxMori Silkworm, during the seasons of short and long rains.

2.15 Innovation and Adoption of Silk

Medical devices: Silk being biomaterial (biological approaches disintegrate bacteria, fungi and cells) is used to ease surgical pains. The outer sericin coating of silk is not absorbable, making it suitable for medical sutures; stitches, bandages and gauzes. A similar process is used to construct specialist under clothing to treat eczema allergies and disposal cups.Surgical infection treatment has evolved to silk nano-coatings which is ease pain and is prevent infections. The research looked into ways bacterial infections could be controlled through cost-effective means in order to reduce health costs. By using silver coated sutures proved effective on the reduction of cell

population, (Desimone S, Gallo A. L, Paladini F, Sannino M, 2004). Paper, canvas for screen printing: in ancient and medieval China, the paper was made out of silk. It was perceived as the most luxurious, practical and valuable material than rice straw, bamboo, linen, wheat and rice straws. Historical discoveries on subjects such as medicine, astrology, divinity, meteorology and maps were done on silk fabrics. (Wikipedia: History of silk).

2.16 Silk Uses and Consumers

There are several silk users and dealers in Kenya, but capacity is still low. They include Gramwa Handcrafts and Kiko Romeo. The research managed to interview ten consumers, to understand the issues surrounding the consumption of silk products locally. Silk is perceived as a high end product but the price may be moderated by blends with other fibers, pierced/Ahimsa silk and cotton or spun silk instead of reeled ones.This is evident in the blends of silk and cotton in Ghanaian Kente (Fening K, 2006) .

The producers are Seritex company, Spin Weave, Mwingi Silk Market, Arabuko - Sokoke Molo Weavers, Rivatex - Eldoret Youth group - Nyeri, and Sarah Jane. Silk Institutes in Kenya also contributes to production; Kkimahuri and training centers for African Silk brand, International Centre of Insect Physiology and Ecology (ICIPE), and National Sericulture Centre (KALRO), Jomo Kenyatta University of Agriculture and Technology(JKUAT) Moi University and others.

Silk can be reeled or spun. Types of thrown silk yarns are singles, tram, organzine two by two grenadine, compense and crepe. Silk fabric types are, brocade, Chiffon, Crepe, taffeta, georgette, tussah, Satin/ pongee, tweed, jersey (knits), charmeuse, Brocade, Broad-cloth, organza, habotai, Georgette, velvet, faille, silk de chine, Shantung, tassah, Crepe, Dupioni, noil, and others. There are more names derived from weight, country of origin, utility and blends of silk with other natural or synthetics fibre.

Uses of silk range from:

- Apparel (Dresses, ball dresses, shirts, coats, blouses, lingerie):

- Bridal and Ball dresses: Wearing Silk Sarees, and punjab suits for marriage and other special ceremonies is a custom by Most Indians and is emulated by other Kenyans. It portrays royalty and prestige. Taffeta is used to make bridals and ball dresses.

- Travel clothes; Silk, being light-weight, makes it suitable for air travel.

- Linings: linings and interlinings can be from fabric silk de chine, ottoman, radium

- Accessories: - umbrella: (Gloria silk); Scarves: surah, chiffon, crepe (light weights fabrics); high-end wigs: raw silk/felt; handbags: faille, velvet,

- Upholstery: fabrics used are, brocatelle, velvet, satin, shantung and others.

- Curtains: These should be protected from direct sunlight. Fabrics used are, habutai (medium weights) fabrics.

- Draperies: satin, radium, pongee

- Duvet: The cocoons are stretched to form sheets or piles of fabric to form quilts for the duvet.

Figure 5: Silk Mens' Kimono, Ladies Kimono and Ladies Saree

Source: Internet, 2017

2.17 Political Significance of Silk

Sericulture was started in Kenya in1972 by the Kenyan Government in conjunction with the Japan International Cooperation Agency. This was enabled by the favorable climate for mulberry farming and silkworm rearing. The head of state occasionally wears silk shirts, and this shows high-status silk offers in dress cord. There is an excellent economical relation between Kenya and China (founder, highest producer and exporter of silk). Kenya can be one of the producers, yet its performance is affected by middle-men and brokers who purchase the cocoons at a low price and lack of awareness of the benefits of silk.

Silk is used for bridal wear in countries such as Japan, China, India, and globally it is revered because of its noble history. It signifies high status, prestige and nobility. During the Han Dynasty, silk was very precious such that it was used to reimburse civil servants and compensate citizens who were particularly worthy (Wikipedia, history of silk).

2.18 Research Gaps

A critical review of past literature showed several research gaps. For instance, a knowledge gap exists on the topic under study as there is limited published literature on the factors influencing adoption of silk raw material and most of the studies available were conducted outside Kenya in the middle-income countries thereby creating a scarcity gap for developing economies such as Kenya. Gowda et al. (2012), discussed the use of modern low-cost tools in silk rearing, mulberry harvesting, and pruning but did not address the issue of how the cost of silk influences adoption of silk as a raw material. Johnsen (2010), examined the role of focal suppliers in strategic networks for internationalization from the standpoint of small-scale Italian and Thai silk suppliers. There exists a geographical gap as the current study will be conducted in Kenya. An objective gap also exists as the study did not address the same objectives as the current study.
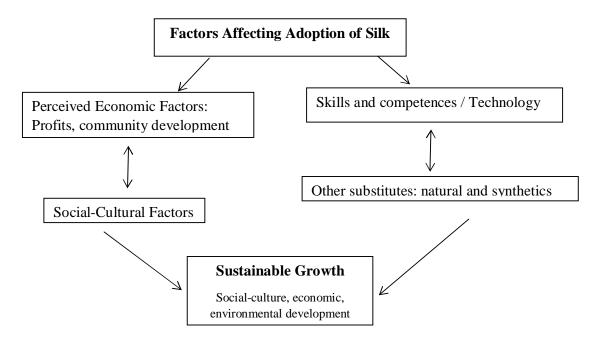
Kar (2012) purposed to explain traditional knowledge management process of self-employed weavers. There exists a contextual gap as the current study will focus on small-scale garment makers referred to as cottage industry. This sector suffers from a shortage of managerial skill and scarcity of technological input (Nelson, 2002).

Carpet weaving is labor intensive and takes the weaver many days, translating into high costs of production, (Odhiambo S, Njuguna D, Chemweno P and Githaiga J, 2014). Silk production process is one of the main textile cottages in Kenya but is faced with a shortage of outputs in its activities; entrepreneurs do not realize enough income due to the level of technology they apply. In the modern technology, cocoons can be reeled by farmers into fibres, yarns/ threads, fabrics, and fashion products to add value. This will give entrepreneurs more profits instead of only selling cocoons.

Gaps are also evident in productivity, skills and costs; Kenya needs more trained apparel workers at the sewing and managerial level because the country relies more on expatriates from India, Mauritius and Sri Lanka, in producing for global clients yet at a very high cost. It was also revealed in the Kenyan Textile and Fashion Industry Report that Kenyan's productivity is not improving in the garment and textile industry; the more productive firms are not thriving, and the less productive are not closing.

2.19 Conceptual Framework

This study was built on the underpinning theories that inform on the study variables including the production cost economic theory, technology determinism theory, and cultural determinism theory. A conceptual framework is a research tool intended to assist the researcher to develop awareness and understand the variables under scrutiny.

Figure 6: Conceptual Framework (Author's Construct, 2017)

For the purpose of this research, a conceptual framework has been developed showing the relationship between the independent and dependent variable. The main objective ►◄ was to determine factors influencing the utilization and adoption of silk by garment makers in Kenya. This study was built on the underpinning theories that inform on the study variables including the production cost economic theory, technology determinism theory, and cultural determinism theory.

Gaps are summarized as follows:

- Lack of ready market and exploitation by middle-men discourage farmers

- Negative beliefs associated with worms; the insects' rough body and irritation to human skin.

- Beliefs associated with worms such as witchcraft

- Insects rough skin, irritation to human skin resulting into many farmers opting out

- Low cocoon output and marketing difficulties

- Lack of facilities to process the cocoons

- Inadequate quality egg production

- Lack of knowledge in host plant farming procedures

- Insufficient host plants for wild silk moth rearing

- Lack of ready market

- Factors related to population growth and poverty

- Inability to harness natural resources sustainability

- The strategies used to control harmful insects result in changes that adversely affect ecosystems and the benefits that people obtain from them

- The impacts of climate change are most felt in Africa, increasing poverty in communities while placing pressure on the environment.

- Underlying these issues is a weak, under-resourced infrastructure for scientific research and inadequate capacity to prevent the negative aspects of insects and to exploit their positive attributes

- The insects are subject to a hereditary infection.

2.20 Logical Framework of the Research Project

The main objective of the study was to investigate the effect of adoption of silk materials by garment makers, in Nairobi, Kenya. The table below summarizes the Logical Framework of this research project.

Table 4: Logical framework of the project (Author's Construct, 2017)

Objectives	Outcomes	Data source	Assumptions	Activities	Data collection instruments	Indicators
Factor influencing adoption of silk materials by garment makers, in Nairobi, Kenya.	Reduction of synthetics fibers and fabrics usage by garment makers in Nairobi, Kenya	Primary and secondary data from thesis, journal, publications, thesis documents ,case studies	Sufficient financing for equipment and tools for silk weaving and production, awareness	Collection of primary and secondary data, research at ICIPE, KALRO, Gramwa and Kiko Romeo	Questionnaires to garment makers in Nairobi CBD, observations, Discussions, interviews.	-Growth of the garment and textile industry in Nairobi , Kenya, more consumption of silk
Effects of substitutes	-Increase in the usage of local silk for sustainabil	Global, regional and Kenyan silk production reports,	Reduced attitudes towards local raw materials	Conduct research on two case study For	Observations: Do own samples through observations, review	Change of attitude by garment makers towards local raw

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				comparis on,	literature on other fabrics	material(si lk)
	ity and growth					
Perceived economic benefits of silk	Reduction in use of second hand clothing out (three year face out by the EAC)	Sustainable Economic growth	Awareness of benefits	Data collection analysis	Interviews, observation	Growth and sustainabil ity
skills and competen ces	Growth and sustainabil ity in garment industry	Quality assurance (KEBS/ policies)	Strengthene d capacity through technology to lessen intensive labor	Research on Productio n and processes		Appropriat e technology application and raw materials
Effect of social cultural attitudes	Demystifi ed myths, attitudes	Literature reviews, respondents	Awareness of the benefits	Dissemin ation,Sen sitization, of findings	Interviews, observation, questionnaires	Purchasing and consuming the end products

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

3.0 Introduction

This study was carried out at Nairobi Central Business District and its environs, National Sericulture Center (K.A.L.R.O) in Thika, ICIPE (Duduville), the Central Business District of Nairobi and its environs (Nairobi Textiles, Biashara Street, Kenyatta Market, Ngara, Westlands, Jericho, Burmah, and Kariobangi and garment-making shops). The Central Business District is densely populated with fabric shops, garment makers and boutiques. Questionnaires, observations and interviews were used in the data collection at the Central Business District of Nairobi, Kenya. Two case studies were done at Kiko Romeo in Yaya Centre, Nairobi and at Gramwa Handicrafts Kwambare, Kiambu.

3.1 Research Design

Research design refers to how data collection and analysis are structured in order to meet the research objectives through empirical evidence economically (Chandran, 2006). According to Cooper and Schindler (2007) research design is the plan and structure of investigation conceived so as to obtain answers to research questions. The type of research was mixed method (qualitative and quantitative).

The research design adopted a case study methodology. A multiple or collective case study allowed the researcher to analyze within each setting and across settings (Baker & Jack, 2008). A collective case study was effective when examining more than one case to understand similarities and differences between cases. Data were collected from a sampled population to determine their current status with respect to selected variables. The researcher was able to research on the social-cultural factors, costs and economic factor, innovation, skills and competencies, other substitutes, impediments and benefits of silk, manufacturers, suppliers, and consumers of silk, to emulate a decision-making model to enhance adoption of silk by Garment makers in Nairobi, Kenya. The study aimed at establishing the factors that influenced the adoption of silk raw materials by garment makers in Nairobi, Kenya.

Two independent case studies were carried out for comparison and analysis purposes. Case studies were conducted at Gramwa-Handcrafts in Kiambu and Kiko Romeo in

Hurlingham. Primary and secondary data were both used in conducting the case studies. Primary data was obtained through the use of questionnaires, in-depth face to face and telephone interviews while secondary data was collected from theses, books, journals, newspapers and internet sources. The research process included the following steps; Research idea, Literature Review, Theoretical formulation of the Research Problem, Empirical Research Questions (operationalization), Research Design Planning, Data Collection, Data Analysis, Answering the empirical research questions, Theoretical Interpretation of the results, Comparison with earlier research, Conclusions. The research activities involved the following:

- Literature review and analysis of secondary data to investigate the factors influencing the adoption of silk raw materials

- Case study of two individual silk workers for comparison

- Analyze the primary and secondary data, and information gathered to create awareness in the textile and garment making industries in Kenya.

- Dissemination to the silk and Garment makers and policy makers in Kenya

- Results and findings will be used to create awareness in the adoption of silk raw materials by garment makers to facilitate an integrated sericulture and garment making industry in Kenya.

3.2 Population

A study population in statistics is the specific population about which information is desired. According to Ngechu (2004), a population is a well-defined set of people, services, elements, and events, group of things or households that are being investigated. This definition ensures that the population of interest is homogeneous. The target population is garment makers in Nairobi and its environs. The Textiles sector comprises 22 large foreign-owned companies operating in the Export Promotion Zones (EPZ), 170 medium and large companies, 8 ginneries, 8 spinners, 15 weaving and knitting companies, 9 accessories manufacturers and over 75,000 micro and small companies, including fashion designers and tailoring units (ACTIF Statistics and recent research by Equity and AFAD). The study population, therefore,

comprised 54 Garment shop owners in the Central Business District (CBD) and its environs. In order to obtain efficient results on the factors influencing the adoption of silk raw materials, it was relevant to get information from the silk sectors. The research will use a representative of stakeholders in the silk value chain: Silk farmer's cooperatives, 2 independent case studies of individual dealers (Kiko Romeo and Gramwa handicrafts), research institutes, educational/ training centres, garment manufactures, weaver's / knitters processors, policy-makers, trade and investments facilitation/promotion institutions, advisory service providers and trade associations.

3.3 Sample

Kombo and Tromp (2009) assert that a sample is a subset of a population that has been selected to reflect or represent characteristics of a population. The study used 70% of the target population as the sample size. According to Mugenda and Mugenda (2003) and Kothari (2004), a sample size of 50% is adequate for a descriptive study which has a small population. This implies that a sample population of 54 respondents would suffice. The sample of the study was 54 Garment shop owners in the CBD and environs. The research used qualitative research; to interview respondents on their views on adoption of silk raw materials for sustainability and growth. Questionnaires were used to collect data from the respondent (garment makers). A quantitative research was used to observe and interview two silk dealers and their engagements based on specific areas: availability and quality of silk, social-cultural attitudes, cost and economic factors, skills and competencies, benefits of silk and the challenges (barriers) that influence adoption of silk.

Table 5: Distribution of Population and Sample (Author's Construct, 2017)

Stake Holders	Total Numbers	One-on-One Direct consultation (No.)	Mail Questionnaire
Policy makers	JICA, ACTIF, KEBS		
Research Institutions:	ICIPE KALRO		1
Case Study	2	2	
Garment makers	54	54	
Consumers		10	

Universities/ ED/Training	Moi University, Jomo Kenyatta University of Agriculture and Technology	1	

3.3.1 Sampling Techniques

A sample definition of a sampling frame is a set of source materials from which the sample is selected (Mugenda and Mugenda, 2003). The purpose of sampling frames is providing a means for selecting the members of the target population to be interviewed in the survey (Bailey, 2008). The sampling frame of this research was 54 Micro Garment shop owners in the CBD and environs. The research used non-probability sampling design by purposive sampling method (snow-ball type): targeted garment makers and two case studies in Nairobi Central Business District and environs. It used both qualitative and quantitative studies.

3.4 Data Collection Instruments

Collection of data was done through primary and secondary methods. Questionnaires, Interviews, discussions, photography, was used to conduct research. The Case study was conducted at Gramwa Handcrafts, Kiko Romeo and garment makers in Nairobi CBD and environ. Silk processes and production data were obtained and analyzed. Several research instruments were used during this study. They were Questionnaires, interviews, observation and photography.

3.4.1 Questionnaire

Primary data were collected through the administration of the questionnaires. The questionnaires quantifiable measures assisted in converting the qualitative responses into quantitative values (Mugenda & Mugenda, (2003) and Zikmund, Babin, Carr & Griffin, (2010)). These questionnaires were self-administered.

3.4.2 Interview Schedules

The research also applied the use of oral interviews to retrieve some information because it is less formal and gives a conducive environment with the respondents.

3.4.3 Photography

The researcher was able to use photography to synthesize the information gathered on sites under study. Photography is important because of the real picture portrayed about the problem under study. Pictures were taken at Kiko Romeo, Gramwa Handcrafts, KALRO, ICIPE and some journals and newsprints that had information about area under study. The use of photography was also applied as this gives information as it is on the ground. This assisted the researcher to synthesis the gathered information.

3.4.4 Observation

The researcher used structured observation to record some specific behavior patterns such as the way garment makers operated and related with clientele and staff. Observation also assisted the researcher to record the type of fabrics being used by garment makers under study.

Table 6: Summary of Methods of Data Collection (Author's Construct, 2017)

Data-Collection Method	Summary of Information to be obtained	Target Sample
Questionnaires	-Other substitutes/ impediments to silk adoption - cost of silk raw materials and its adoption by garment makers -skills and competences effect on adoption of silk raw materials -Perceived economic benefits of silk to garment makers - Social Cultural attitudes factors affecting adoption of silk materials	54 Garment Makers 2- case studies at Kiko Romeo and Gramwa Handcrafts, consumers
	Processes: i)silk: degumming cocoons, reeling, spinning,	

	weaving designing, finishes (dyeing and printing) silk-fabric: ii)Garment Design: sourcing fabrics, design process and management constructions:(dyeing/printing/weaving/crotchet/knitting/Embroidery/patchwork/ finishes) activities Iii) Design process (sketching from inspirations, making patterns, cutting, sewing /knitting/ crochet, marketing and selling to end user). **Production:** post-harvest, reeling, re-reeling and selection of cocoons, unwinding of the filament, re-reeling, throwing, Twisting, Doubling, and Trippling of silk yarn, quality control-degumming, bleaching, dyeing and printing the filament, construction of the apparel, upholstery, and accessories. **End products;** **-A**pparel (dresses, suits, lingerie's), accessories**,** scarves, ties, silk jewelry Medical devices: gauzes and bandages, Bed linen: bed sheet, duvets, pillows. **Technology application:** Community sustainability, ethical, Kenyan and African, eco-friendly for sustainability and growth Cost Marketing/ sales/ promotion strategies **Challenges:** sourcing raw materials, skills, availability and quality, cost, marketing,	Kiko Romeo Gramwa Handicrafts
Interviews	Face to face and telephone interview were conducted to gather some data at Kiko Romeo, Gramwa Handcrafts and Garment makers at the CBD of Nairobi.	Garment makers, Kiko Romeo,Gramwa Handcrafts

3.5 Analysis of Data

The data and information obtained through the questionnaire were first checked for completeness. Data gathered from correctly filled questionnaires was coded, tabulated and analyzed using SPSS by both descriptive statistics which included mean and

standard deviation to capture the characteristics of the variables under study and inferential statistics which include regression coefficient which was used to analyze the relationship of the dependent and the independent variables. Editing and coding were used to give a clear picture of the targeted objectives while frequency distribution enabled the researcher to meaningfully describe the distribution of measurements used as graphs and charts. This analysis enabled the researcher to effect the adoption of silk materials by garment makers, in Nairobi, Kenya. Mixed method (qualitative and quantitative) were used for the numerical generation of data and specific classifications for content analysis to generate data. Data were arranged under themes reflecting the research objectives. The research used Quantitative approach: raw data from garment makers, Gramwa Handcrafts, Kiko Romeo, KALRO and ICIPE cleaned corded, numerical generation of data. Qualitative approach: Raw data was cleaned and sorted into specific classifications for content analysis to generate data which is verbal and descriptive.

3.6 Data presentation

The results are presented on demographic characteristics; skills and competencies, perceived benefits, social-cultural attitudes, cost of production, substitutes, and technology and adoption of silk. Use of both quantitative (numerical-where the garment makers will be interviewed through questionnaires) and qualitative (words and phrases) analysis.

Purposive, and snowball sampling technique; whereby the researcher purposely targeted a group of respondents (garment makers) who were relevant for the study. Quantitative approach was applied through the use of histographs, pie charts and bar charts. Qualitative approach was used by narratives and clusters. Observation was through discussions and photography.

3.7 Variables

- Level of education was determined by asking respondents to tick from the choices; certificate, diploma, or university levels.

- Business characteristics were derived from the respondent's business location, source of raw materials, and the number of staff.

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- Source of design ideas was determined by the types of fabrics the respondents said were the substitutes to silk.

- Target clientele was derived from the social class or religion that included the Hindus, Christians and others.

3.8 Proposed framework model

The frame work was to interpret the factors affecting the adoption of silk by garment makers in Nairobi, Kenya. The frame work model is supposed to show the correlation between Garment makers, textile and production industry, suppliers, marketers, consumers and converters in order to effect the adoption of silk raw materials. It also illustrates how the regulating bodies such as the government, institutes, NEMA, and policy makers ensure safety and protectionist policies, high standards and appropriate technology application.

CHAPTER FOUR: ANALYSIS OF FINDINGS

4.1 Introduction

This chapter presents the research findings on the adoption of silk raw materials by the garment makers in Nairobi and its environs in Kenya. It comprises data analysis, findings and interpretation. Results were presented in tables, charts, figures and diagrams. The analyzed data was arranged under themes that reflected the research objectives. The results on Demographic Characteristics, Cost of Silk and Adoption of Silk Materials, Skills and Competencies and the Adoption of Silk Raw Materials, Perceived Benefits and Adoption of Silk Materials, Social Cultural Attitudes and Adoption of Silk Materials, Silk Material Importation, substitutes (synthetics), effect of secondhand clothing on silk adoption, policies and policy-makers influence on the adoption of silk and others.

A total of 54 respondents from among enterprise employees, members of weaving and sales branches, members of government/ non-government agencies were interviewed/ observed. A qualitative research method called "narrative inquiry" was used to interpret respondents' data and stories gathered from the field study. Analysis of documents was also a method used. Findings indicated that community weavers inherit traditional weaving knowledge across generations and learn informally through interaction, observation, socialization, cooperation and apprenticeships in the natural settings of the cooperative enterprise system.

4.2 Case study 1: Gramwa Handicrafts

Gramwa-Handcrafts used silk to practice the health benefits such using natural silk raw materials. She used the floss from Eri silk (wild silk), pierced cocoons and wastes to spin her yarns. She also used plant dyes for dyeing her fibres, yarns and fabrics for the eco-friendly and healthy environment.

Table 7: Gramwa Handcrafts Findings (Author's Construct, 2017

Objective	To investigate the effect of silk adoption by garment makers in Nairobi, Kenya
Products	Hand-made spun silk yarns, knitted tops, shawls and kikoys, table mats, couch shawl, silk fabrics, cushion covers
Processes	Sourcing of cocoons, degumming (boiling),bleaching, dyeing, spinning, weaving/knitting/ sewing apparels and accessories
Technology applied	Electrical Spinning machine, hand loom weaving, boiling of the cocoons, dyeing
Products	Shawls, scarves, Fabrics, hand spun yarns, cushions, Hand knitted tops, Couch throws, Table mats and Floor rugs
Skills applied	Degumming,spinning,knitting,crotcht,stitching,weaving,dyeing,bleaching
Marketing strategies	Attends exhibitions, supply to individual clients on order business cards, brochures and others
Key findings	-Capacity of silk can be improved by Gramwa having her own cocoons/ attaching herself with sericulture like KALRO or ICIPE; She has prepared the garden to plant mulberry for silkworm feeds. -Awareness by the locals is lacking -Cost of silk does not affect the adoption of silk because silk is valuable/ in high demand but capacity is low. -Capacity of silk needs to go up because some garment makers have a high demand for it -Technological factors affect adoption of silk; silk has been labour intensive -Need for more workers to raise capacity
Limitation	Not getting cocoons on time Intensive labour in production and processing of silk Brokers lowering prices

4.2.1 Skills and Competencies

Gramwa used silk for sustainable growth by applying appropriate technology in spinning, weaving and dyeing. Production processes included the technology of boiling and degumming cocoons and use of skeins for yarn storage. She also processed her own natural dyes using available plants parts; seeds, roots, stems, leaves, onion peels, tea leaves, blackjack and bixa seeds with alum as mordant and acetic acid agents. Cloth technology was portrayed in the dyeing of fibres, yarns and fabrics, spinning to form yarns for weaving and weaving and knitting various products. She used hand loom for weaving, electric spinning machine to spin her floss which she converted into yarns for weaving. There was one permanent employee and an assistant weaver who came when summoned. Her daughter also worked with her in dyeing processes and marketing the products.

Sourcing of cocoons: Gramwa Handcrafts outsource cocoons from farmers and at National Sericulture Centre in Thika (KALRO). The figure below shows boiling apparatus used by Gramwa.

Figure 7: Boiling apparatus used by Gramwa

Spinning: After reeling, and throwing, shorter lengths of inferior silk filaments from waste materials are spun to together as is in the case of cotton, wool and linen. Spun silk fibers are not expensive because they are not lustrous, strong or elastic as reeled silk. The threads are soft, and the fabrics become fuzzy after wearing. Spun silk is cheaper than reeled silk and may be got from sources of staple silk such as pierced cocoons as a result of breeding moths having emerged from the cocoons; Double cocoon forming as a result of being spun lose together -they are also known as dupioni silk; Floss that is brushed from cocoons before reeling; Frison, which is the

coarse and uneven silk fibre got at the beginning and the end of each cocoon; and Scrap silk is got when the machine waste left from reeling and throwing processes.

Figure 8: Spinning silk floss using electric and spinning machine on the right

Figure 9: Floss used as raw material at Gramwa with silk yarns on the right

Figure 10: Skeins used to wind on the fibere after spinning by Gramwa

Requirements for dyeing with natural dyes

i.   Pan/container, heater, running water

ii.   Hydrogen peroxide

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iii.   Whitening powder

iv.   Detergent

v.   Advanced Bio

vi.   Sodium bicarbonate

Process of Bleaching

Step 1: Soak the yarn in clean cold water. Add 5% detergent, preferably 'omo' and soak yarn for 30 minutes. Rinse the yarn with running tap water

Step 2: Add 5-7% of Sodium Bicarbonate in 20 liters of water; bring it to boiling point for 1 hour; stir the cloth every 3 minutes. Then remove the yarn, wash in cold, clean running water. Finally, dry the yarn. It is still not fully bleached at this point.

Step 3: In order to complete bleaching, add 'Bio Plus' to boiling water and then immerse the yarn and boil it for 45 minutes; Stir every 15 minutes; Remove the cloth and rinse in running water; Immerse it in water containing an optional whitening agent; and Boil the solution for 10 minutes.

Dyeing with acid dyes

0.1% of hydrogen peroxide is poured into 10 liters of water. This is enough for 5kg bleached yarn (10 meters of bleached fabric).

Boil the solution and stir every 15 minutes.

Add 1% glacial acetic acid and leave for 15-20 minutes.

Rinse the yarn/fabric in running water.

Soak for 5 minutes in 5 liters of clean water plus 2% hydrogen peroxide.

Wash or rinse the yarn/material in cold water.

Dyeing with natural dyes:

Three types of natural dyes are used:

1. Acacia bark and flowers
2. Black jack (bidden pillosa), roots and flowers
3. Bixa seeds

Processes in dyeing with Bixa seeds

1: Weighing fabrics to be dyed **2:** Select Aluminium **3:** Boil bixa seed and aluminium

4: Sieving dye solution **5:** Dyeing fabric **6:** Add Nitric acid into last rinsing water

7: Ironing fabric after dyeing **8:** Spun fabric before and after dyeing **9:** Reeled fabric before and after dyeing

Processes in dyeing with natural dyes

Natural dyes are made from:

      Acacia bark and flowers

      Black Jack (Bidden Pillosa) roots and flowers

      Bixa roots

      Dry Onion peals

Process:

Boil 20 Litres of water in a container

Add either Alum or Potassium Dichromate

Then 1Kilogram of natural crushed roots, flowers, seeds or barks is added to the boiling water

Boil for 5-10 minutes

Filter the solution

Immerse into the filtered solution bleached fibre, yarns or fabric.

Let it soak for 30- 45 minutes.

Handloom Weaving: Weaving can be done by power loom or handloom. At Gramwa Hand Crafts, a hand loom is used for weaving. Silk is woven into fabric using a loom; this is after warping and beam mounting. Weaving is achieved when the warp and weft yarns interlock. There are different types of fabrics according to the type of yarn, size, and kind of weaves required by the weaver. The preparation involves threading carefully; any threads which are cut are remedied by repairing them. For weaving to place, the pedals are alternatively pressed to create a shed or tunnel for the shuttle to pass through. The right pedal when press, the shuttle shoots to the left while the left pedal shoots to the right when pressed. To make the material compact, the frame is pressed. This process is repeated, and the fabric is formed

Figure 11: Handloom used for weaving and fabric formed by handloom at Gramwa

Production cost and adoption of silk: Gramwa Handcrafts has products made from 100% silk but she can get her profit margin because she starts at raw materials which she constructs. She also blends silk with other alternative fibres such as cotton and

acrylics to reduce the cost of silk, when need arises. Silk blends very well, with most fibres, both natural and man-made. Blends contribute to the balance of aesthetics, performance and price in the choice of fibres.

Perceived Economic Benefits: Gramwa-Handcrafts used silk to practice the health benefits such using natural silk raw materials. She used the floss from Eri silk (wild silk), pierced cocoons and wastes to spin her yarns. She also used plant dyes for dyeing her fibres, yarns, and fabrics for eco-friendly and healthy environment.

End Products: at Gramwa are fibres, hand-spun yarns, fabrics, Shawls, scarves, cushions, Hand knitted tops, Couch throws, Table mats and Floor rugs. The international market for natural fabrics is very trendy because most people are aware of biodegradable fabrics that are healthy to mankind and environment. Silk yarns are also used to manufacture medical devices, high-end wigs and hardened to substitute metal, (Mutungi T.2015). One silkworm cocoon will naturally produce a yarn of between 500 and 1000 meters of filament; the statistics revealed at ICIPE 1, in Kenya; silk fibre measuring 1183.35metres and weighed 0.35grams (Nguku E,2012). This is very economical to textiles yarn and fabric formation since silkworm strains with high elongation has the least number of winding breaks due to increased elasticity. Silk is essential for Textile and garment makers in Nairobi, Kenya because it is harvested three times a year and is therefore available locally. Sericulture also requires small investments in providing raw materials for textile industries and creates jobs for the rural population; preventing migration to big cities.

4.3 Case study 2: Kiko Romeo

Context: Kiko Romeo means 'Adams Apple' and was founded 18 years ago by Ann Mcreath (Scotish-born) who is the director and head designer. After completing fashion design in Rome, followed by years of working as fashion designer in Barcelona. Kiko Romeo is based on Ethical, slow, eco, sustainable, couture, African, Kenyan and African made Fashion.

Challenges: High rentals charges takes far too high of a turnover to manage according to Ann Mcreath.

Future Plans: Kiko is in the middle of rebranding and revisiting their first designs through export market expansion as an affordable luxury Kenyan brand which will establish her as one of the ten African names. She also aims to get into home décor and accessories. Kiko Romeo has plans to go E-Commerce by September 2017 for specialized one-of-a-kind Kiko Romeo classics to sell globally. Globally, sales are through Zuraa.com Platform. This distribution model is to focus on wholesale (through retailers) to be able to reach out to wider range of locations in Kenya, markets across Africa and beyond. Kikoti (one of the lines) will sell through the mentioned models as well as direct to customers at fairs, markets, and festivals.

Sales Outlets: Kiko Romeo sells to their existing customers through appointments and also holds special collection presentations to their clientele. Also sells directly to customers.

Table 8: Kiko Romeo Case Study Findings

Objectives	1.Effect of silk adoption by garment maker
	2.Effect of availability and quality of silk to adoption of silk by garment makers
	3.perceived benefits of silk
	4.Technological factors and adoption of silk
	5. effects of barriers(synthetics, other natural fibers and second hands
The Cases	1.Kiko Romeo
	2.Gramwa
Data collection	Face to face in-depth interviews, questionnaires, telephone, photography interviews, attendant of national workshop(July 2015-silk day at KALRO)
Key Findings	methods towards natural fabrics and dyes and markets Kenyan, African, eco-friendly, products
Main limitations-	- How to use silk , high rents
	- How to handle silk during the production and processing
	-care during pressing and washing (maintenance)
	-Getting silk fabric on time

Social Cultural Factors and Adoption of Silk: Kiko Romeo has adopted her methods towards natural fabrics and dyes and markets Kenyan, African, eco-friendly, products for a better environment and sustainability.

Perceived Economic Benefits: In the findings, Kiko Romeo used silk for local community development, economic growth, and sustainability. She involved them in dyeing, printing, batik, crochet, knitting, and patchwork. The latter was done by recycled swatches/wastes from her studio. The brokers who sold to her fabrics, worked with sericulture farmers (cocoon harvesters, reelers, spinners to produce fibres, yarns, and fabrics. The value chain creates jobs for dyers, printers, knitters, weavers, fashion designers, and marketers for sustainability and growth. She has a market for silk, and the supply is not adequate. There is also the challenges of running high rental premises. Fashion Products at Kiko Romeo comprise dresses, accessories, (sashes, hats bags), jewelry, men shirts, skirts, blouses and others.

Figure 12: Silk garments display at Kiko Romeo

Source: Author, 2016

Skills and Competencies: Kiko Romeo is a fashion house and displayed products which portrayed skills in Textiles and Fashion design. The designing process consists of (idea, sketching from inspirations, making patterns, cutting, sewing (stitches were even and neat and no hanging threads), knitting, crochet, marketing and selling to end user). Textiles application skills are portrayed in techniques such as Batik, Tie-and-Dye, printing, patchwork, and crotchet. Kiko Romeo applies high standards skills in

marketing (packaging, cards, discount offers) and use of the awareness through website, exhibitions locally and abroad.

Handling skills: At Kiko Romeo, there was need for silk handling expertise. Close supervision by head designer was crucial in areas such as heat setting and garment care in general. She agreed that training in silk handling is essential for sustainability and growth. Silk handling is an issue for most people and education on the same is needed. Sourcing of silk is done then it is dyed or printed. It is then made into apparels and accessories. Soiled or dirty outfits should be washed immediately after every use because perspiration weakens the fabrics. Washing and dry cleaning the silk items is easy due to its smooth surface that does not attract dirt. It is considered a hygienic fabric. Silk shrinks with washing, but this is restored by ironing using moderate heat. Silk should be dry cleaned except in cases where it is written "washable." Hand washing is done using warm soapy water, mild soap or detergent. After washing, roll in a towel to remove the excess water. Do not twist or wring. Protein fibres need to be bleached with a lot of care; a mild bleach of hydrogen peroxide or sodium perborate is safer. Strong bleaches containing sodium hypochlorite deteriorates it. Ironing of silk should be done when damp, inside out. Silk is sensitive to heat and will start decomposing at 330 degrees Fahrenheit. Silk items should be dried in the shade away from excess sunlight. Exposure to too much light weakens silk, and therefore products such as upholstery and drapery must be protected from direct exposure to the sunlight.

4.4 Garment makers in Nairobi Central Business District

Garment makers in Nairobi, Kenya are made up of over 75,000 Micro and Small Scale Garment shop owners, including fashion designers and tailoring units.

4.4.1   Response Rate

The number of questionnaires that were administered was 70. A total of 60 questionnaires were adequately filled and returned. This represented an overall satisfactory response rate of 85.7% as shown in Table 4.1. According to Mugenda and Mugenda (2003) and Kothari (2004), a response rate of above 50% is adequate for a descriptive study. Babbie (2004) also asserted that return rates of above 50% are acceptable to analyze and publish, 60% is good, 70% is very good while above 80% is

excellent. Based on these assertions from renowned scholars, 86% response rate is excellent for the study.
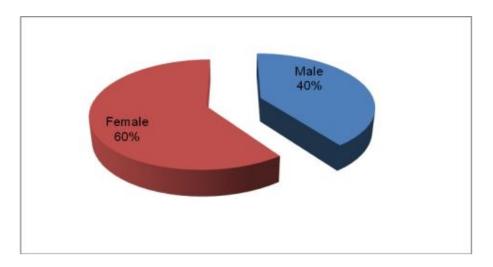
Table 9: Response Rate

Response	Frequency	Percentage
Returned	60	86%
Unreturned	10	14%
Total	**70**	**100%**

Source: Author, 2016

4.4.2 Gender of the Respondents

The respondents were requested to indicate their gender. Majority of the respondents who were 60% indicated that they were females while only 40% were males. This implied that most garment shop owners in the CBD are females.

Figure 13: Gender of the Respondents
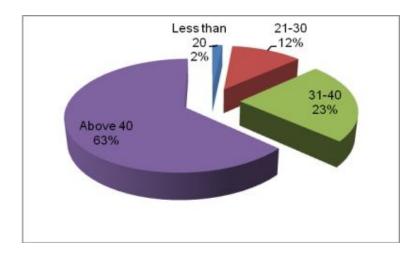
Source:Author, 2016

4.4.3 Age of the Respondents

The respondents were further asked to indicate their age. 60% of the respondents stated they were above 40 years, 23% of the respondents stated that they were between 31- 40 years, 12% of the respondents indicated that they were between 21 – 30 years while only 2% of the respondents reported that they were less than 20 years.
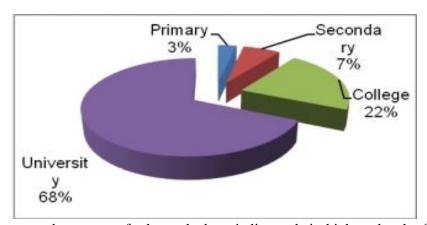
This implied that most of the owners of garment making shops in the CBD and its environs were elderly people and thus had good knowledge about the business.

Figure 14: Age of the Respondents

4.4.4 Level of Education

Figure 15: Level of Education of the Respondents

The respondents were further asked to indicate their highest level of education. Majority of the respondents who were 68% indicated that their highest level of education was 68%, 22% of the respondents indicated college, 7% of the respondents indicated secondary while only 3% indicated primary. This implies that most of the garment owners' shops in the CBD were educated and thus they were skilled to run the businesses.

4.4.5 Age of the Business

The respondents were further asked to indicate how old their business was in operation. Majority of the respondents; 45% indicated that their business was between 3 – 5 years, 30% stated their business was between 6 – 8 years, 18% reported that their business was above eight years while only 7% of the respondents indicated that their business was less than three years. This implied that most of the businesses were established.
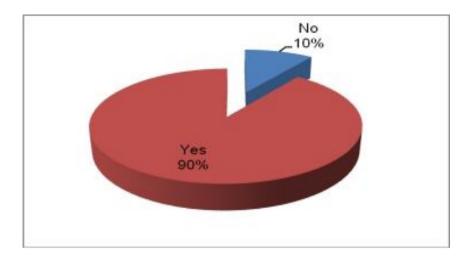
Figure 16: Age of the Business

4.4.6 Cost of Silk and Adoption of Silk Materials
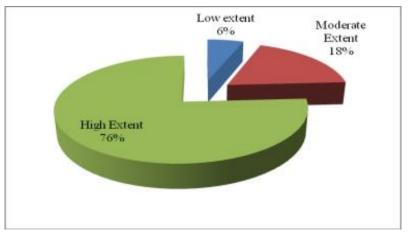
The first objective of the study was to establish the influence of cost of silk on the adoption of silk raw materials. Results in the figure below revealed that majority of the respondents who were 90% indicated that cost of silk and adoption of silk materials. Only 10% of the respondents indicated that cost of silk does not affect the adoption of silk raw materials.

Figure 17: Cost of Silk and Adoption of Silk Materials

The respondents who indicated yes were further asked to indicate to what extent cost of silk affect adoption of silk raw material. Majority of the respondents who were 76% indicated great extent, 18% of the respondents reported moderate extent while only 6% of the respondent reported 6%. This implied that cost of silk affected its adoption significantly.
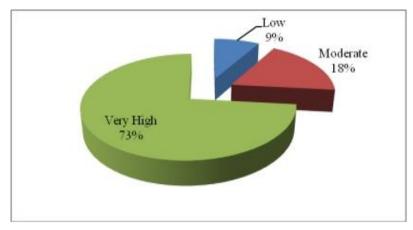
Figure 18: Extent of Cost of Silk and Adoption of Silk Materials

Source:Auhor, 2016

The respondents were further asked to indicate how they would rate the price of silk material compared to other material. Majority of the respondents who were 73% indicated that the price of silk material is very high, 18% of the respondents indicated that the price of silk material is moderate while only 9% of the respondents indicated

that the price of silk material is low. This implied that most people perceive silk material to be too expensive.
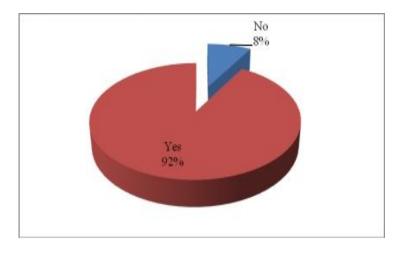
Figure 19: Price of Silk Materials

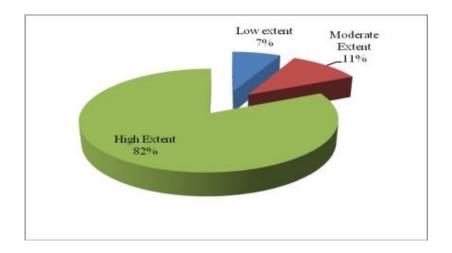## 4.4.7 Skills and Competencies and the Adoption of Silk Raw Materials

The second objective of the study was to determine the influence of skills and competencies on the adoption of silk raw materials. The respondents were asked to indicate whether skills and competences influence the adoption of silk raw materials. Majority of the respondents who were 92% indicated that skills and abilities influence the adoption of silk raw materials while only 8% of the respondents indicated that skills and competences do not influence the adoption of silk raw materials.
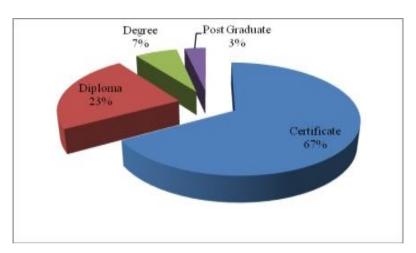
Figure 20: Skills and Competences

The respondents were further asked to indicate to what extent skills and competences influence the adoption of silk raw materials. Majority of the respondents who were 82% indicated great extent, 11% indicated moderate extent while 7% indicated low extent.

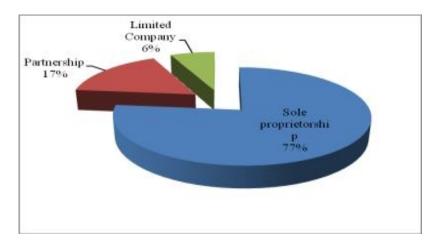**Figure 21: Extent Skills and Competences influence adoption of silk raw materials**

The respondents were further asked to indicate their employee qualifications. Majority of the respondents who were 67% noted their employees had their highest level of education as certificate, 23% of the respondents had their highest level of education as diploma, 7% of the respondents had their highest level of education as degree while 3% of the respondents had their highest level of education as 3%.
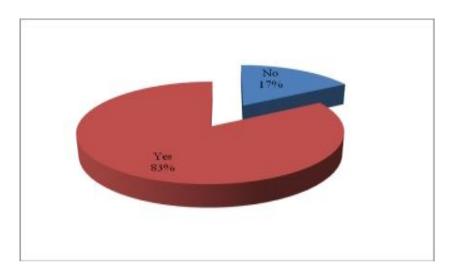
Figure 22: Employee Qualification

Additionally, the respondents asked to indicate the type of business they run. Majority of the respondents who were 77% of the respondents indicated sole proprietorship, 17% of the respondents indicated partnership while 6% of the respondents indicated limited company. This implied that most of the garments making shops in the CBD are sole proprietorship.
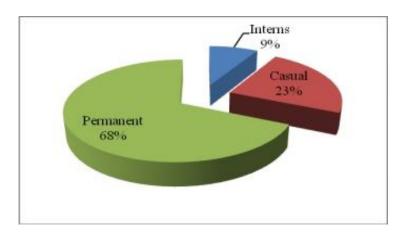
Figure 23: Type of Business

The respondents were also asked to indicate whether they take their employees for training. Majority of the respondents who were 83% indicated that they take their employee for training while only 17% indicated that they do not take their employees for training.
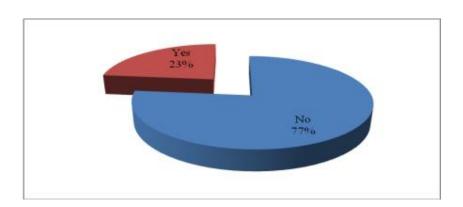
Figure 24: Employee Training

Also, the respondents asked to indicate the kind of employee they have. The results revealed that majority of the respondents who were 68% indicated that they had employed permanent employees, 23% of the respondents indicated that they had employed casual employees while only 9% of the respondents indicated that they had employed interns. This implied that most of the employees in the garment making shops in the CBD and its environs were permanent.
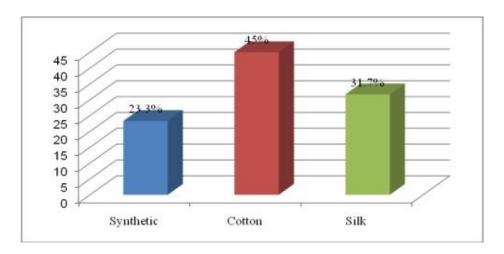
Figure 25: Kind of Employees

4.4.8 Perceived Benefits and Adoption of Silk Materials
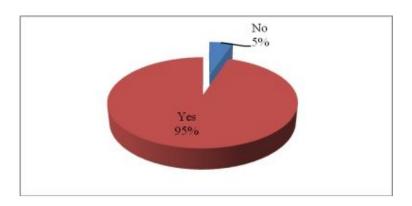
Figure 26: Quality of Silk Material

The third objective of the study was to examine the influence of perceived benefits of the adoption of silk raw materials. The respondents were asked to indicate whether silk is of better quality than other materials. Majority of the respondents who were

77% of the respondents indicated that silk is not of better quality than other materials while only 23% of the respondents indicated that silk is a better material than other fabrics. In addition, the respondents were requested to indicate the fabric they use most in their business. Majority of the respondents who were 45% of the respondents indicated that they used cotton material most in their business, 31.7% of the respondents indicated that they used silk most while only 23.3% of the respondents indicated that they used synthetic.

Figure 27: Fabric Used

4.4.9 Social Cultural Attitudes and Adoption of Silk Materials

Figure 28: Social Cultural Attitude

The fourth objective of the study was to establish the influence of social-cultural attitudes on the adoption of silk raw materials. The respondents were asked to indicate whether social-cultural attitudes affect the adoption of silk raw materials. Majority of the respondents who were 95% indicated that social-cultural attitudes affect the

adoption of silk raw materials while only 5% of the respondents indicated that social-cultural attitudes do not affect the adoption of silk raw materials. The respondents who indicated yes were further asked to indicate to what extent social-cultural attitudes affect the adoption of silk raw materials. The results revealed that majority of the respondents who were 84% indicated great extent, 12% of the respondents indicated moderate extent while only 4% indicated low extent.

Figure 29: Extent that Social Cultural Attitude affect adoption of silk material

Also, the respondents were further asked to indicate the religious group of people who mostly purchase silk garment from their business. Majority of the respondents who were 50% indicated that most people who buy silk garment from their business were Hindus, 30% of the respondents indicated Christians while only 20% indicated Muslims. This implied that most people who purchase silk material are Hindus.
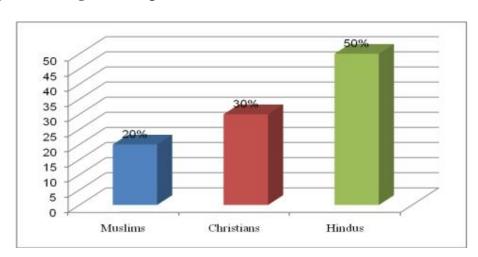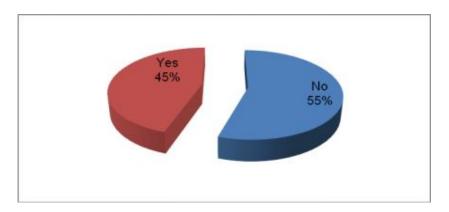
Figure 30: Religious Group
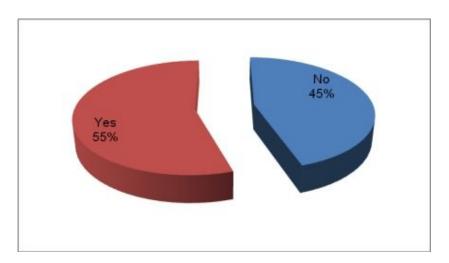
4.4.10 Adoption of Silk Materials

The respondents were asked to indicate whether they import silk material from other countries. Majority of the respondents who were 55% indicated that they do not import silk material from other countries while only 45% of the respondents indicated that they import silk material from other countries.

Figure 31: Silk Material Importation

The respondents were requested to indicate whether they would encourage garment users to use silk material. 55% of the respondents indicated that they would persuade garment users to use silk material while 45% of the respondents indicated that they would not encourage garment users to use silk material.

Figure 32: Encourage Silk Material Usage

4.4.11 Decision-Making Framework

Decision-making models are about making good judgment, the latter may be a quick decision, impulsive (spur of the moment) emotional. Purchase decision-making process is created by consumer and context of decision making. It varies according to individuals, decision, (Bettman, Lace, and Payne, 1988), and varies according to individual decision context, (Shan, 2002).

Figure 33: Frame work model for garment makers in Nairobi, Kenya

Regulations

Source: author, 2017

In the frame work, there are regulations affecting every sector of textiles and production, converters, suppliers, garment makers and marketers. These are Government regulations, policy makers, institutes, environmental body(NEMA).

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Textiles manufacturers and producers require good seeds and eggs for quality produce from institutes such as ICIPE and KALRO. Processing involve converters such as the dyers, printers, weavers and finishers. There is a need for suppliers for textiles sector and consumers. The same applies to marketing; textiles raw materials need marketing as well as the garment products.

CHAPTER FIVE: DISCUSSION, CONCLUSIONS, AND RECOEMDATIONS

5.0 Introduction

This chapter addresses the summary of the findings, the conclusions, and the recommendations. This was done relation with the objectives of the study. This section provides an overview of the findings from the analysis. This is done in line with the objectives of the study. The following are answer to research questions:

5.1 Cost of Silk and Adoption of Silk Materials compliance

The first research question was to establish the influence of cost of silk on the adoption of silk raw materials. The findings showed that cost of silk extently influenced the adoption of silk materials. This was supported by the questions in the questionnaire where majority of the respondents said that cost of silk greatly influenced the adoption of silk materials. The findings revealed that sericulturist by optimizing the use of modern low-cost tools in silk rearing, mulberry harvesting, and pruning can enjoy a huge market not only locally, but also globally. Just as the research by (Gowda et al.2012).

5.2 Skills and Competencies and Adoption of Silk Materials compliance

The second research question set out to determine the influence of skills and competencies on the adoption of silk raw materials. The findings revealed that skills and competences greatly influence the adoption of silk materials. This was supported by the questions in the questionnaire where a majority of the respondents said that skills and competencies greatly influence the adoption of silk materials. These findings were consistent with that of Mappiggau (2012), who sought to determine and identify core competence and sustainable competitive advantage (SCA) of small silk weaving industries in Wajo District and to formulate its roadmap development. The results of this research indicated that silk weaving was selected through public consultation and TEV analysis as a core product.

5.3 Perceived Benefits and Adoption of Silk Materials compliance

The third research question examined the influence of perceived benefits on the adoption of silk raw materials. The findings revealed that perceived benefits greatly influences the adoption of silk raw materials. This was supported by the questions in the questionnaire where majority of the respondents said that they perceive the quality of other materials as better and this has greatly influenced the adoption of silk material.

5.4 Social-Cultural Attitudes and Adoption of Silk Materials

The fourth and last research question sought to establish the influence of social-cultural attitudes on the adoption of silk raw materials. The findings revealed that social-cultural attitudes greatly influence the adoption of silk raw materials. This was supported by the questions in the questionnaire where majority of the respondents said that social-cultural attitudes greatly influence the adoption of silk raw materials. These findings agree with Chandima (2010), who examined the roles played by culture to livelihood resilience, questioning cultural traditions potential to offer alternatives/adaptive strategies, to strength livelihood assets of rural communities and generate new opportunities during vulnerabilities caused by economic, social and political changes. The findings showed how culture and traditional values strengthened livelihood resilience and argued that while the impulse for change may be brought about by external influences, adaptation comes from within, through dynamics, which are specific to values of the people.

5.5 Discussions

The findings indicated that Gramwa applied appropriate technology in spinning, weaving and dyeing. Capacity of silk can be improved by Gramwa by having her own cocoons. Awareness by the locals at Gramwa is missing. She has the potential for increasing labour and creation of employment by engaging more skilled workers. She worked mostly alone and yet the firm used to have many employees. She needed to engage more skilled workers in order to increase her yields in productive.Capacity of silk needs to go up because some garment makers have a high demand for it. She can construct fabrics for garment makers who are affiliated with her firm. Cotton supply went down and she uses silk and blends some products with cotton and acrylics. Silk

has a lot of benefits both for the rural community and the garment makers due to value chain that it offers in sericulture and fashion industry.

Gaps are also evident in productivity, skills, and costs; Kenya needs more trained apparel workers at the sewing and managerial level because the country relies more on expatriates from India, Mauritius, and Sri Lanka, in producing for global clients yet at a very high cost. Research revealed in the Kenyan Textile and Fashion Industry Report that Kenyan's productivity is not improving in the garment and textile industry; the more productive firms are not thriving, and the less productive are not closing. Kenya can be one of global silk producers, yet its performance is affected by middlemen who purchase the cocoons at a low price and lack of ready market.

Garment making enterprises do not grow because they lack awareness in the following areas: More sustainable and locally available raw materials (fibers, yarns, and fabrics), rendering the sector into importing very costly ones. Skills and competencies factors affect adoption of silk; silk involves extensive labor both at pro-harvest and post-harvest stages. There is need to apply appropriate technology to achieve high yields. There is the use of modern low-cost tools in silk rearing, mulberry harvesting, and pruning, (Gowda et al. 2012).

Although it is important for the production of silk to be of utmost quality, silk production in Africa is faced by some limitation that is a setback to local cocoon producers (JAICAF, 2007; Akinkunmi & Odebiyi, 2001). Concerning the disturbance of forests, the community can engage in the activities of sericulture so that they can own the project. Also a profit and sustainable conservation initiative need to be stressed for broader and diversified income sources, (Raina et al., 2009, 2011) as suggested.

There are also social-cultural attitudes that have made some farmers to abandon sericulture. Beliefs associated with witchcraft can be demystified through training and awareness programs, to educate farmers about the benefits of silk. Appropriate work clothes can be worn to prevent skin irritation caused by insects' rough skins. Johnsen (2010) examined the role of focal suppliers in strategic networks for internationalization from the perspectives of small and medium-sized Italian and Thai silk suppliers. There exists a geographical gap as this paper was conducted in Kenya.

An objective gap also existed as the study did not address the same objectives as the current study.

Kar (2012) purposed to explain traditional knowledge management process of self-employed weavers. There exists a contextual gap as this paper focuses on garment makers referred to as cottage industry. This sector suffers from shortage of managerial skill and scarcity of technological input (Nelson, 2002). Carpet weaving is labor intensive and takes the weaver many days, translating into high costs of production, (Odhiambo S, Njuguna D, Chemweno P and Githaiga J, 2014). Silk production process is one of the main textile cottage industries in Kenya but is faced with shortage of outputs in its activities; entrepreneurs do not realize enough income due to the level of technology they apply. In the modern technology, cocoons can be reeled by farmers into fibres, yarns/ threads, fabrics, and fashion products to add value. This will give entrepreneurs more profits instead of only selling cocoons.

5.6 Conclusions

From the findings above, the study concluded that cost of production of silk, skills and competence perceived economic benefits, technology and social-cultural attitudes greatly influenced the adoption of silk material by garment makers. There was need to sensitize the garment makers on the need to utilize local silk for sustainable growth and development. There was lack of awareness of the availability of silk. Silk being a viable textile raw material, Government should encourage farmers, provide incentives and increase the capacity of silk. There is also need to demystify the myths and beliefs that Kenyans hold against silk. These are beliefs related to witchcraft, high cost and maintenance of silk. There are many benefits that silk offer, such as economic, environmental, sustainability and community development.

5.7 Recommendations of the Study

The study recommended that Silk reeling units should be established in the counties which have sericulture farms and at least one weaver's training centers should be opened having free training and lodging facilities. There was also the need to sensitize garment makers and consumers on the benefits of local raw materials(silk). Since silk is underutilized by garment makers in Kenya, there is need to venture and explore on this to take advantage and engage in the sericulture activities and the end products

such as the fabrics, yarns and fabrics apparels and upholsterers. The government should patronize silk industry, and the supply of silk yarn should be under government control to control the prices of silk material, and this will encourage garment users to use silk material.

5.8 Areas for Further Studies

The study aimed to investigate the effect of adoption of silk materials by garment makers, in Nairobi, Kenya. This called for garment makers in Nairobi County and its environs, in Kenya. Area of further study could consider other garment makers in other counties in Kenya and make comparison with Nairobi County.

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APPENDIX I: QUESTIONNAIRE

FACTORS INFLUENCING THE ADOPTION OF SILK RAW MATERIALS
FOR SUSTAINABLE GROWTH:

A Case of Garment Makers in Nairobi, Kenya

BY ROSEMARY AWINO ORINA - B51/64766/2010

[A] BACKGROUND INFORMATION

1. Gender of respondents

    Male   ☐

    Female

2. How old are you? (Years)

    Less than 20:   ☐

    21-30:   ☐

    31-40:   ☐

    Above 40:

3. What is your level of education?

    Primary   ☐

    Secondary   ☐

    College   ☐

    University   ☐

4. How old is your business?

    Less than 3 years: ☐

    3-5 years: ☐

    6-8 years: ☐

    Above 8 years   ☐

Section B: Cost of production and Adoption of Silk Materials

1. a) In your opinion does cost of silk affect adoption of silk raw material?

Yes   ( )   No ( )

b) If yes to the above question to what extent does cost of silk affect adoption of silk raw material?

Great Extent ( )   Moderate ( )   Low Extent ( )

2.How would you rate the price of silk material compared to other materials

Low ( )

Moderate ( )

Very High ( )

Section C: Skills and competencies and Adoption of Silk Materials

1.a) In your opinion does your skills and competence affect adoption of silk raw material?

Yes ( )   No ( )

b) If yes to the above question to what extent does skills and competence affect adoption of silk raw material?

Great Extent ( )   Moderate ( )   Low Extent ( )

2. What are your employee qualifications?

Certificate   ( )

Diploma   ( )

Degree   ( )

Post Graduate   ( )

3. What type of business do you run?

Sole proprietorship   ( )

 Partnership   ( )

Limited Company   ( )

4. Do you take your employees for trainings?

Yes ( )   No ( )

5. What kind of employees do you have?

Interns   ( )

Casual   ( )

 Permanent   ( )

Section D: Perceived Economic Benefits and Adoption of Silk Materials

1. In your opinion do you think silk is of better quality than other materials

Yes ( )   No ( )

2.What types of fabrics are used most in your business?

Synthetic   ( )

Cotton   ( )

Silk   ( )

Section E: Social Cultural Attitudes and Adoption of Silk Materials

1.a) In your opinion does social cultural attitude affect adoption of silk raw material?

81

Yes   ( )   No ( )

b) If yes to the above question to what extent does social cultural attitude affect adoption of silk raw material?

Great Extent ( )   Moderate ( )   Low Extent ( )

2.In your opinion which religious group of people purchase silk garment more?

Muslims   ( )

Christians   ( )

Hindus   ( )

Section F: Adoption of Silk Materials

1.Do you import silk material from other country

   Yes   ( )   No ( )

2. Would you encourage other garment makers to adopt silk material?

   Yes   ( )   No ( )

Section G: Technology and Adoption of silk

Does technology affect adoption of silk in these areas?

1.Infra structure

Yes ( )   No ( )

2. Production

   Yes   ( )   No ( )

3. Marketing

   Yes ( )   No ( )

APPENDIX II:INTERVIEW GUIDE

1.Types of raw materials Used by designer / garment makers

_____
_____

2. Processes involving silk (degumming, spinning/ reeling, weaving, printing, dyeing and finishes)

_____
_____

3. Production activities in the enterprise

_____
_____

4. Products made from silk raw materials

_____
_____

5. Marketing and promotion strategies

_____
_____

6. Challenges in silk adoption by designer's / Garment makers

_____
_____

APPENDIX III: TIME TABLE SCHEDULE

NO	Activity	Jan-Mar 2012	Apr-Jun 2012	Jul-Sept 2012	Oct-Dec 2012	Jan-Mar 2013	Apr-Jun 2013	Jul- Sep 2013
1	Topic selection	■						
2	General identification of appropriate title for study		■					
3	Introductory theme on Research undertaking			■				
4	Laying foundation for purposive Research				■			
5	Research development					■		
6	Foundation for Chapter Two						■	
7	Literature Review						■	
8	Preparation for Methodology							■
9	Research Instruments							
10	Primary Data collection for Garment makers							
11	Editing, coding, tabulation and Analyzing data							
12	Presenting findings to supervisors/ correction							
14	Research at KALRO							
15	Report writing for KALRO							
16	Research at ICIPE							
17	Report writing for ICIPE							
17	Case Study at Kiko Romeo							
18	Casestudy at Gramwa Handcrafts							
	Analysis of findings							
19	Compiling/Presenting the findings to supervisors/corrections (Chapter 4)							
20	Chapter 5							
21	Defence to Supervisors							

22	Correction of project Report/							

APPENDIX IV: CASE STUDY PICTURES
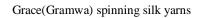
Shop display and Sewing area at Kiko Romeo

Source:Author, 2016

Source:Author, 2016

APPENDIX V:CASE STUDY PICTURES AT GRAMWA

Weaving looms at Gramwa workshop   Grace(Gramwa) spinning silk yarns

Source:Author, 2016   Source:Author, 2016

Second hand clothes at kibuye, kisumu

Source: Jacob Owiti, 2014)

Timothy Mutungi of Tuinuane Youth Group in Imenti South

Source: The Standard Paper, August, 2015

APPENDIX VI: Images Taken at ICIPE:

Laboratory apparatus/ chemicals   Weighing machine   Boiling Machines

Author, 2016

Eri silk worms'   Moth and cocoons at ICIPE   Silk fabrics (ICIPE)

Source: Author, 2016
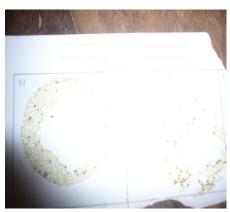
Source: Author, 2016

APPENDIX VII:SERI CULTURE AT NATIONAL SILK CENTRE(KALRO)

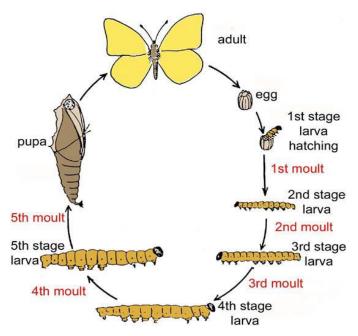Technology at KALRO Sericulture / silk worms protected with foil paper

Cocoon mountages   Cocoons

Silk thread

SPUN SILK

SILK/COTTON BLENDED KIKOY

APPENDIX VIII: SILKWORM LIFE CYCLE

Source: Internet, 2016

Stages in silk quilt construction

APPENDIX IX: ACCESSORIES MADE OUT OF SILK

Silk Scarf

Source: Internet, 2016

Silk fabrics

spun silk used for cushion

Silk shawl

Silk used for wall painting

Source: internet, 2016

Source:Internet, 2016

APPENDIX X: TECHNOLOGY IN SILK – PRINTING TECHNIQUES

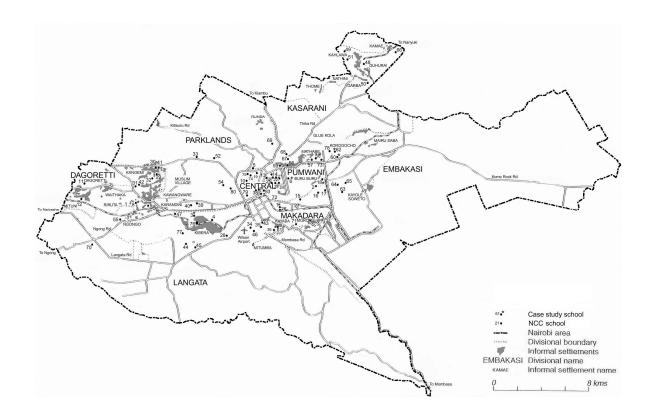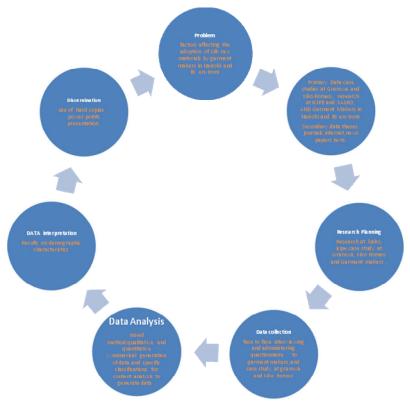Screen Printing Using Silk Mesh (Source: internet, 2015)

Silk Mesh
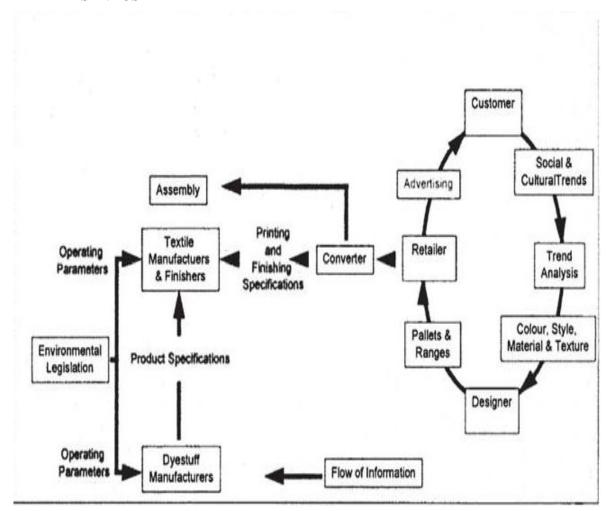
APPENDIX XI: MAP SHOWING STUDY SITES

APPENDIX XII: RESEARCH DESIGN PROCESS
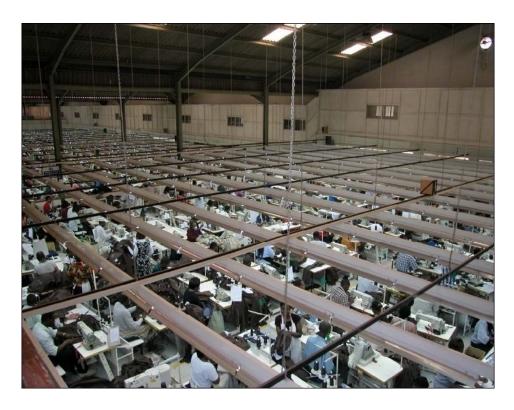

Source: Author, 2017

APPENDIX XIII:SAMPLE OF COMMUNICATION CHANNEL IN TEXTILES INDUSTRY

Source: Bramra T, 2007

APPENDIX XIV:PRODUCTION FLOOR AT EPZ, RUARAKA, NAIROBI

Source:Author, 2008