ADOPTION OF GREEN INITIATIVES BY LIBRARIES IN KENYA FOR ENVIRONMENTAL SUSTAINABILITY

BY

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A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF DOCTOR OF PHILOSOPHY IN LIBRARY AND INFORMATION STUDIES, DEPARTMENT OF LIBRARY, RECORDS MANAGEMENT AND INFORMATION STUDIES, SCHOOL OF INFORMATION SCIENCES

MOI UNIVERSITY

ELDORET, KENYA

2023

DECLARATION

DECLARATION BY THE CANDIDATE:

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DEDICATION

I dedicate this research proposal to my children - Hailey, Nolan, Tyler and Liana, my wife Patricia, and my parents, Dr Daniel and Dr Florence, who all make life worth living.

ABSTRACT

Global environmental concerns have seen a rise in go-green campaigns and a go-green movement, along with solutions and calls for consumers, corporations, and governments to be more proactive in going green in every aspect. Yet, despite these 'go-green' campaigns, little is known about the green library concept in the African context, Kenyan libraries included. Subsequently, this study was undertaken to explore the adoption of green library concepts in Kenya for environmental sustainability with a view to proposing strategies that can be used to guide libraries in the going green transformation. The objectives of the study included: establishing the comprehension and perception of Kenyan librarians towards the concept of greening libraries for environmental sustainability; analyzing the greening methods/practices adopted by Kenyan libraries; determining the factors driving and impeding libraries' embracement and implementation of the green concept and proposing strategies to guide libraries in transforming to 'green libraries'. The study was informed by the Norm activation model to account for perceptions on embracing and implementing the going green concept; Value-Belief-Norm (VBN) theory of Pro-Environmental Behavior to inform factors driving environmental sustainability in Kenyan libraries, and the USGBC LEED standards that explained the best practice in going green and strategies applicable in green initiatives. The study adopted a qualitative approach and a descriptive research design. A sample of twelve libraries was purposively drawn from a population of 227 academic, public and special libraries in Kenya. Data was collected using semi-structured interview schedules complemented by observation and document review and analyzed using grounded theory. The findings showed that libraries in Kenya, under their umbrella organizations, have taken advantage of their knowledge of greening concepts through adopting greening practices and coming up with strategies to enhance green libraries and promote environmental sustainability. Strategies implemented and adopted to enhance green libraries and promote environmental sustainability include redesigning and renovating of library structures and facilities to meet the ever-changing user demands in line with the green library standards Therefore, this study concludes that the absence of notable green library initiatives in most of Kenyan libraries is a multiple factor of inadequate knowledge and appreciation of libraries role in environmental sustainability on one hand and, slow and possibly reluctance in adopting and implementing green libraries initiatives. Librarians in the Kenyan libraries are aware of and understand the green building concepts and have embraced and adopted different green initiatives, albeit partially. Three strategies as recommendations for fully going green are proposed: active user involvement in green initiatives, improving performance and growth measuring metrics, and maintaining green library standards as guided by the IFLA ENSULIB green library checklist.

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I want to express my appreciation to my supervisor's Dr Emily Bosire-Ogechi and Dr Damaris Odero for their untiring support and guidance during the preparation of this thesis.

ABBREVIATIONS AND ACRONYMS

BRE	Building Research Establishment, UK
BREEAM	BRE Environmental Assessment Method
CASBEE	Comprehensive Assessment System for Building
CUEA	Catholic University of Eastern Africa
ENSULIB	Environmental Sustainability of Libraries
GBCS-MF	Green Building Certification System for Multi-Family
ICTs	Information and Communication Technologies
IFLA	International Federation of Library Associations
ISO	International Organization for Standardization
ISK	International School of Kenya
IT	Information technology
JaGBCS/JSBC	Japan Green Building Council/ Japan Sustainable Consortium
KNLS	Kenya National Library Service
KLA	Kenya Library Association
KLISC	Kenya Library and Information Services Consortium
KU	Kenyatta University
LEED	Leadership in Energy and Environmental Design
LIS	Library and Information Science
NACOSTI	National Commission for Science, Technology and Innovation
POE	Post Occupancy Evaluation
UON	University of Nairobi
USGBC	United States Green Building Council
USIU	United States International University

DEFINITION OF OPERATIONAL TERMS

Greening – the process of transforming living environments and artefacts such as a space, lifestyle or brand image into a more environmentally friendly version.

Green library services - services that benefit the planet's sustainability and conserve natural resources.

Green Information Literacy – instruction on green operations and practices and embedding sustainable thinking into information literacy instruction.

Greening concept - practices that can lead to more environmentally friendly and ecologically responsible decisions and lifestyles.

Environmental sustainability - making decisions and taking action that are in the interests of protecting the natural world, with particular emphasis on preserving the capability of the environment to support human life.

Sustainable libraries – libraries that aim to meet their own needs without compromising the ability of future generations to meet their own needs.

Green building - a building that, in its design, construction or operation, reduces or eliminates negative impacts and can create positive impacts.

CHAPTER ONE

INTRODUCTION AND BACKGROUND INFORMATION

1.1 Introduction

> *"[...] environmental sustainability in libraries is obvious as such, but no one has systematically spelled out why or how it should be implemented. The discussion around green libraries has been largely limited to the buildings, i.e., to subjects like the energy-efficiency of new constructions and basic renovations. [...] However, we cannot rebuild all libraries and make them energy efficient, and we have to find other ways. Libraries have to operate environmentally now and in the future in existing buildings and without new resources. But how do we achieve this?" (Hauke & Werner. 2013: p5).*

The above excerpt succinctly exemplifies libraries participation in ecologically sustainability as a continuous central concern. And in response, libraries have taken multifaceted approach.

Climate change is a major global problem largely attributed to human activities are the leading cause (UNEP, 2020, Asim & Ahmad, 2022). Notably, since the industrial revolution, the average global temperatures have been increasing steadily, resulting in climate change threatening life on earth. Data from the World Meteorological Organization showed that in 2019, there was extraordinary global heat, retreating ice and record sea levels due to heightened human activities (UNEP, 2020). The average temperatures for 2015 to 2021 and 2010 to 2021 are the highest ever recorded. 2019 was previously recorded as the second hottest year (Olhoff & Christensen, 2019). According to NASA Release 22-006, the last eight years have been the hottest ever recorded, according to NASA, with 2021 coming in at sixth place. The latest figures from NASA and the National Oceanic and Atmospheric Administration (NOAA) show that global temperatures are 1.1°C above preindustrial levels and creeping ever closer to the 1.5°C limit set by politicians in Glasgow last year (NASA, 2022). Unfortunately, even with the increasing destruction of the environment due to climate change, there are no adequate

global commitments to lessen climate change (World Meteorological Organization, 2019). The Emissions Gap Report (EGR)(2019) projected that by 2030 emissions will get to 56 Gt CO2e, which is double what they should act. There is thus the need to avert warming beyond 1.5°C and minimize emissions by 7.6% annually in the next 10 years to 2030 (Olhoff & Christensen, 2019).

According to UNEP (2020) every institution, governmental and non-governmental alike, is currently in an endeavor for the problem of global warming that requires urgent attention. Nations agreed to a legally binding commitment in Paris to limit global temperature rise to no more than 2°C above pre-industrial levels. They also offered national pledges to cut or curb their greenhouse gas emissions by 2030. The Paris Agreement commitments were updated since they became ineffective. The update was reviewed at the climate change conference known as COP 26 in Glasgow, UK, in November 2021, resulting in the Glasgow climate pact that is meant to drive action across the globe on mitigation- reducing emissions; adaptation – helping those already affected by climate change, finance – enabling countries to deliver on their climate goals and collaboration- working together to deliver even more significant action. The success of this pact will have great consequences for the world. In a report, the United Nations warns that, if countries cannot agree on sufficient pledges in another five years, the emissions reduction necessary will leap to a near-impossible 15.5% every year. The report further states that the unlikelihood of achieving this far steeper rate of decarbonization means the world faces a global temperature increase that will rise above 1.5°C. Every fraction of additional warming above 1.5°C will bring worsening impacts, threatening lives, food sources, livelihoods and economies worldwide (UNEP, 2020).

The environmental changes in the world are changing the world in ways that are threatening the existence of life. This threat of environmental changes is bound to increase in the coming years if additional proactive actions are not taken (Tong & Ebi, 2019). A press release by UNEP in 2016 noted that the scenario is even worse in developing countries, such as Kenya, where because of the weak government and environment regulatory systems and lack of awareness and good will from organizations, there is high environmental degradation which has exposed these countries to severe environmental changes.

Libraries have not been left behind and are engaging in green initiatives to lessen global warming and safeguard the environment through the green library initiative (Singh & Mishra, 2019). Librarians are slowly becoming eco-conscious and developing the sense of creating libraries that minimize power consumption and become energy efficient and environmentally friendly to attain sustainable libraries or green libraries. Green libraries describe library structures designed, built, renovated, operated, or reused in an ecological and resource-efficient manner (Meher & Parabhoi, 2017). The Green library initiative emerged in libraries around 1990, and since then, libraries globally have been adopting several practices to reduce the library's negative impact on the environment (Fedorowicz-Kruszewska, 2020).

1.2 The 'Going Green' Movement

The Go Green movement was inspired by growing realization that human industry was obliterating irreplaceable wastelands and endangering human health resulted in the earliest efforts at managing natural resources (Buys & Hurbissoon, 2011). The increasing number of environmentally conscious consumers brings about more go green campaigns

along with sustainable solutions (Laberge (2015). Ordinary people and corporations can therefore contribute to the creation of healthy living environment.

The go green movement recognizes the need to protect the Earth and promote a healthy environment through a series of initiatives like the conservation movement, the environment movement and earth day. With global warming gradually affecting our earth, consumers, corporations and governments need to be more proactive in going green in every aspect. Lockwood (2006) argues that it is possible to go green wherever you may be, including the home, workplace, public spots, community and globally. He adds that the home is the easiest place to initiate a 'go green' campaign by making every family member conscious of the impact of their carbon footprint.

Karioja, (2009) stated that acts of going green are easy by reducing, recycling and reusing resources in the household to nurture go green habits. Such habits can include using compact fluorescent bulbs (or LED Bulbs), which saves energy and produce less heat to keep the home cool and having draft-proof windows and doors to reduce household carbon footprint significantly. Beyond the home environment, the go green movement also emphasizes on creating a healthier atmosphere in the public, community and even the workplaces to spur productivity and attitude amongst workers.

The go green movement aligns with the United Nations Sustainable Development Goals (SDGs). The goals emphasizes on active engagement by all member countries to increase responsiveness to environment sustainability. Similar to other developing countries, Kenya has adopted various green movement initiatives spearheaded by the national government and individual organizations that are determined to play a role in securing the future. Libraries are known to be organizations with the capacity to impact society and, as such, are expected to respond to the call for sustainable development in the wake of

climate change and environmental degradation. Green initiatives for environmental sustainability can be achieved by libraries, and this justified the researcher situating the study in the library. It is important to explore how libraries are planning for a sustainable future.

1.2.1 The Green Library Movement

The green library movement emerges as a response to the uncertainty caused by climate change, leading to behavioral changes with the hope of creating a sustainable future. The movement focuses on four broad areas: sustainability of scholarly communication, measuring and improving sustainability, green library and facilities and green library and practices (Abbey, 2012). The green library movement advocates for greener library spaces and strategies that allow integration of ecologically friendly practices in a platform that guides future decisions regarding library buildings, equipment, digitization, and efforts of library networking. The efforts should be supported by sustainable practices by users, staff and library management (Fedorowicz-Kruszewska, 2020). Today, the movement has attracted a mix of librarians, libraries, cities, towns, college and university campuses committed to greening libraries by reducing their environmental impact on the planet. They have embraced the task of creating and adopting more sustainable communities.

1.2.2 Importance of Libraries Going Green

Speaking to American Library Association, Wong (2021) underscored the role of libraries in environmental sustainability in his statement "To thrive and evolve into the future, ALA [libraries] must adopt the 'triple bottom line' mindset of sustainability: We must embody practices that are environmentally sound, economically feasible, and socially equitable."

Libraries are important channels for disseminating and educating the community about responsible environmental practices (Kurbanoglu & Boustany, 2014). As such, librarians have the responsibility of acting as the epitome of sustainability by providing relevant and suitable information that relates to green issues and concerns. Go green libraries improves internal environment in terms of quality through conservation of resources such as energy, water and paper and use of natural and biodegradable products and construction materials (Hauke & Werner, 2013). Libraries require significant amount of resources, water and energy. Green libraries movement emphasizes the adoption of energy saving initiatives such as recycling waste materials, reusing water and using efficient lighting systems (Shah, Kumar and Shah, 2015).

Libraries have an important role of communicating a clear green identity. The improved day-to-day operations and procedures can help to educate the community about responsible environmental practices (Hossain, Hecimovic, & Choudhury, 2015). As a socially responsible body, libraries should incorporate the ecological sustainability in their marketing plan. According to Hauke and Werner (2012) green libraries make crucial contribution towards maintaining the ecological balance in the environment and in the preservation of the planet's natural resources and systems. Scherer (2014) observes that going green can be influential in bringing environmental awareness in the community by teaching environmental sustainability.

1.2.4 Green Libraries for Environmental Sustainability

Strategies for promoting environmental sustainability in Green Libraries are vast. Amongst these include the use of cloud-based information services which help to improve environmental sustainability of digital libraries and information services Chowdhury (2016) identifies other strategies of going green libraries such as Eco conscious movement and the awareness for library operational expenditures to include the green

practices, conservation programs and sustainable solutions in libraries. Jankowska (2014) suggests that such conservation programs in libraries include: concentrated efforts on reducing energy spending such as installing energy-efficient lighting, replacement of single panel windows with double panel windows which are better sealed and, energy conserving practices including shutting down computers when the library is closed to lower power consumption.

Dias in (2017) explored some of the strategies for promoting environmental sustainability in libraries. The study identified strategies such as reducing the use of resources and promoting recycling as: encouraging waste separation; encourage recycling of ink cartridges and toners; reducing water and energy consumption among others. Green printing which is a movement that involves reusing and recycling to overcome the burden of resources used in copying and printing (Singh & Mishra, 2019). Green printing combines sustainability with printing and this includes the use of recycled paper, printing on both sides of a paper and using digital formats when possible. Such practices help to ensure environmental sustainability in libraries by reducing the use of resources and promoting recycling.

Libraries have been challenged to take up the role of growing sustainability collection and online sustainability resources to enhance the student's education potential (Stark, 2012). Several proposals of how libraries can achieve these have been put forward. These include building of a core collection of sustainability books as well as a strong web presence (Aulisio, 2013), adoption of environmentally sustainable practices such as reducing the use of toxic chemical cleaners to switch to environmentally friendly cleaning products, green cleaning and recycling (Antonelli, 2008). There is no underrating the need for libraries to adopt green information technology which ensures provision of

services in a sustainable way. Hauke, Grunwald and Wilde (2014) however underscore planning as a crucial consideration that should be taken to ensure that the materials used and the designs adopted create a natural and green atmosphere.

There are notable libraries that have adopted the going green library for sustainable development. One such library is Kotka city library. According to Sonkkanen et al. (2013) the eco-activities in this library were sparked by the national eco-support project that focused on training employees to spread environmental awareness in their places of work to reduce environmental impact. The green ideologies that have been implemented in this library include organized recycling of waste, good practices of saving paper and electricity, solar panels installation on the roof, a green wall that is covered in plants, eco-shelves (using reclaimed or recycled materials, like wood, glass and iron, to create sustainable shelves) and, a collection of information package on environmental issues to familiarize the users with the concepts of environmental sustainability.

Another example of an exemplary library that has started the move towards the green movement and the concept of sustainable development in its daily activities is the Kemijärvi Library. Some of these changes observed include savings and rationalization of work processes, reviewing of policies that reduce the consumption of electricity, turning off lights in rooms that remain unoccupied for more than ten minutes and replacement of windows in the library to improve insulation in the building. In addition, location of the library naturally makes can lead to high heat consumption during winter due to high ceiling causing warm air to rise to the ceiling leaving customers and work areas with minimal heat. The plan to introduce remote working days especially during the winter saves on fuel cost for cars and heating (Sonkkanen et al. 2013).

Movements towards greening of libraries in the United States are also quite vivid as evident in the building of green library buildings to reduce their environmental impact (Antonelli, 2008). These include provision of green library services, greening of existing library facilities and implementing sustainable practices in the library. According to Aulisio (2013) libraries are also providing meeting places for communities to meet and be part of the sustainability projects. The consideration by these libraries of the green values is said to have resulted in development of actions that are based on sustainability (Antonelli & McCullough, 2012). In the process of becoming green, libraries have been obeying recycling rules and engaging in creating environmental awareness by educating consumers to live in an environmentally friendly way (Choudhury, 2013).

It is generally accepted that going green entails adoption of measures such as recycling and reuse to reduce the consumption of the available resources. Brennan and Cotgrave (2014) opine that the process requires the use of specific equipment which reduces energy consumption to allow effective use of resources. Lam et al. (2010) similarly reckoned that going green requires the construction of green buildings and finding building materials and products that are compliant. The researchers add that the implementation of the green concept is nonetheless faced with many challenges. Among them is the unavailability of sustainable building material as there is the uncertainty in terms of the performance of the sustainable material which are preferred in the construction of green buildings. According to Lam et al. (2010), the adoption of the green concept also brings additional responsibility for construction maintenance. Changes of material type during construction only increases the costs incurred. There is also a high risk of inaccurately estimating the costs, which increases the likelihood of the project facing greater potential of failure.

Moreover, as Hwang et al. (2017) noted, the high cost of sustainable materials and equipment coupled with delays in completion of sustainable buildings and lack of sustainable building knowledge can result in cost overrun. Zhang, Shen, Wu, and Qi (2011) identifies barriers to achieving green building practices to include the high cost of green appliances and energy saving materials at the design phase. According to Nduka and Ogunsanmi (2015), unfamiliarity with green technologies can result in delays in the process of construction and design. Going green efforts are also hampered by insufficient policy implementations and risks associated with different site change practices and different contract form. Zhang, Plattern, and Shen, (2011) agrees that it is these costs in the construction of green buildings that make it costlier to build green libraries than conventional building.

Guidelines on the execution of green concepts have been developed but uncertainty exists in their application. As Nduka and Ogunsanmi (2015) noted that some of the green initiatives such as the adoption of solar energy in building faces challenges due to policy issues. Adoption of green energy is further hampered by factors such as the low cost of other energy alternatives such as electricity and availability of oil and natural gas (Nduka & Ogunsanmi, 2015). Lack of expertise and knowledge of local technicians and engineers in some countries when it comes to solar and wind technology is another factor cited as impeding implementation of green concepts. Other impediments of incorporating sustainable designs into practice identified include client resistance knowledge, potential extension of project schedule (Ahn et al. 2013), challenges associated with the insurance and liabilities when offering warranty on non-standard green methods and materials as well as conflict of public regulations or policy (Nduka & Ogunsanmi, 2015).

According to Kurbanoğlu and Boustany (2014) transforming libraries to become green entails pursuing practices and knowledge that can lead to environmentally friendly and ecologically responsible decisions to protect the environment. The knowledge fields for transforming libraries include recycling, reusing, reducing and minimizing waste and pollution to contribute to sustainability (Malpas & Proffitt, 2017). Environmental literacy is a strategy that has been adopted by libraries and it includes the degree of capacity to perceive and interpret the relative health of environmental systems, allowing appropriate action to be taken to maintain, restore and improve their health (Antonelli & McCullough, 2012) and to promote environmentally responsible citizenship (Kurbanoğlu & Boustany, 2014).

Greening of libraries has become pervasive, and many organizations are finding ways to incorporate green thinking in their decisions. Libraries efforts towards reducing waste by minimizing their carbon footprints which has led to addition of environmentally responsible practices in their services have not gone unnoticed (Kurbanoğlu & Boustany 2014). Libraries have been taking more proactive green practices to assist communities to serve and become sustainable and green. Steps taken include the adoption of green operation and practices, green programs and services, green collections and green information systems (Antonelli & McCullough, 2012). Creative green programs are introduced in communities to broaden awareness through provision of information and resources for green living.

Libraries have become centers for green education in their communities and this includes the provision of information about alternative medicine and growing food. To this end, several strategies adopted by public library in their steps towards going green have been identified. The steps are creation of community gardens for educating patrons on

successful gardening practices (Kurbanoğlu & Boustany 2014). Another step is the retrieval of information which has been improved through standardization in practices and processes, sharing of resources and advocating for green user behavior with regards to energy usage (Antonelli, 2008) and the selection of materials whose content assesses and informs green practices and the selection of materials which generate less carbon dioxide emission (Kurbanoğlu & Boustany, 2014). Libraries have also adopted selection of green resources when building up green collections on topics such as green computing, organic gardening and energy conservations amongst others to facilitate access to green information (Connel, 2010).

The preliminary review of environmental sustainability demonstrates a huge gap in environmental sustainability practices across the world. Human activities are increasingly contributing to climate change that continue to harm the environment and threaten the existence of life in the future. For example, due to the rising temperature the year 2019 witnessed the highest average global temperature ever recorded, which caused massive retreating ice and record sea levels. Experts still warn of human activities if not checked will render the environment unsustainable. They predict that by 2030 emissions will be double of what they should be. There is therefore a need for humans to react to minimize emission and ensure the environment remains sustainable. The green movement is one of the reactions that every institution, governmental and non-governmental alike have adopted to tackle the issue of global warming. Libraries have not been left behind and are engaging in green practices to lessen global warming and safeguard the environment through the green library initiative. However, preliminary review of green library adoption for environmental sustainability shows a sluggish implementation of the green library concept, especially in the local context. To this end this study sought to investigate the adoption of green library concepts in Kenya for environmental sustainability with a

view of proposing strategies that can be used to guide libraries in the going green transformation to help establish a sustainable environment.

1.3 Statement of the Problem

Aytac (2019) underscores that the opportunity for libraries to be directly involved in environmental sustainability was bolstered by IFLA's push for libraries to be co-custodians of the UN 2030 Sustainable Development Goals with specific targets addressing environmental dimensions of sustainable development. However, not much follow up has been done to see if all libraries follow the IFLA directive. Earlier, the American Library Association (2015, p.2), resolved that "libraries ought to demonstrate leadership in making sustainable decisions that positively address the respect and use of natural resources, create healthy indoor and outdoor environments that will stabilize and reduce their long-term energy costs, help build more sustainable communities, and thereby increase community support for the library. However, there is a gap in some countries where no notable resolutions have been made for instance Kenya and most African countries to help address the issue of environment change.

Library institutions, especially from the developed countries have come up with interventions towards environmental sustainability. One of these actions is the green library initiative. This concept has been embraced within the library management with an emphasis on environment sustainability, health of library patrons and staff and providing for the needs and interests of tomorrow's generation of users (Datta, 2015). The main concern of green libraries is decreasing libraries' environmental effect (Kurbanoğlu & Boustany, 2014).

Much as this concept is so important, there is limited evidence about the adoption of the green library concept in the African context, Kenyan libraries included. Past literature has

alluded to the adoption of greening initiatives in Kenyan Libraries in Kenya with university, public and community libraries aiming to build libraries that matched users' greening expectations. Mutuku (2018) examined green library initiatives undertaken at the Kenya National Library Service (Nakuru Branch). The study found that the library focused on literacy and environment to create awareness about green library initiatives and environmental sustainability. The library focused on building designs, waste reduction, water conservation, banning plastic bags and planting more trees, shrubs and flowers in the library environment. Mutuku (2018) noted that the greening initiative was ranked among the top five greening initiatives at the International Federation of Library Association and Institutions (IFLA) Green Library Award Competition in 2017. Few other studies have examined the achievements of green library initiatives in Sub-Saharan Africa, particularly in Nigerian libraries (Okpidi-Urhibo, 2023; Oyelude & Alabi, 2013). The studies have reported an increase in discourse on green policy, actions and awareness campaigns but lack of funding has hampered the actualization o green library initiatives in libraries.

Although there has been a new trend to compliance and certification by green building standards in Africa and Kenya such as EDGE and LEED that can be used to certify green buildings, it is not clear whether these have been used to ascertain the green status of organizations such as libraries. It can reasonably be argued that the limited green library initiatives in many Kenyan libraries highlights the inadequate knowledge and appreciation of libraries role in environmental sustainability on one hand and slow and possibly reluctance in adopting and implementing green libraries initiatives on the other hand. Subsequently, this study was undertaken to explore the adoption of the green library initiatives in Kenya for environmental sustainability with a view to proposing strategies that can be used to guide libraries in going green.

1.4 Aim and Objectives of the Study

The purpose of this study was to explore the scope and level of adoption of green library concepts in Kenyan libraries for environmental sustainability with a view of proposing strategies that can be used to guide libraries in the going green transformation.

1.4.1 Objectives of the Study

The objectives of this study were to:

i. Establish the perceptions of Kenyan librarians towards the greening library initiatives for environmental sustainability.
ii. Assess the greening methods/practices and initiatives adopted by Kenyan libraries.
iii. Determine the factors driving and impeding adoption of the green library initiatives in Kenyan libraries.
iv. Propose strategies to guide libraries in transforming into 'green libraries'.

1.5 Research Questions

To achieve the above objectives, the following research questions were to be addressed:

i. How do Kenyan librarians perceive the green library initiatives in promoting environmental sustainability?
ii. What are the greening methods/practices and initiatives adopted by libraries in Kenya?
iii. What are the driving or impeding factors that influence adoption of green library initiatives in Kenyan libraries?
iv. How can libraries in Kenya strategically transform to green libraries?

1.6 Assumption of the study

This study was premised on the assumption that a significant number of libraries in Kenya:

i. Have inadequate understanding of green initiatives for environmental sustainability.
ii. Are struggling in adopting the green concepts and initiatives in their buildings, processes and procedures and community awareness programs.
iii. Are unable to actively contribute to environmental sustainability.

1.7 Significance of the Study

It is hoped that the findings of the study will impact on the following parties:

1.7.1 Libraries

For libraries not acquainted to or yet to embrace the green library concepts, this study is a useful resource for learning the concepts, strategies and mechanisms of effective adoption and implementation of green concepts. The literature and findings of this study guides policymakers in policy development the libraries in Kenya have implemented green initiatives with a view of ensuring environment sustainability.

1.7.2 Lecturers

The identified and reviewed standards of green and sustainable libraries can be given more attention and can be used in training and imparting of knowledge thereby influencing future potential library professionals. Further, the findings can be used by lectures to give a local or rather Kenyan perspective of how green libraries can be implemented.

1.7.3 Researchers

The reviewed literature and the study findings will go a long way in filling the current dearth in empirical literature on the phenomenon of green movement and sustainable library concept in the context of libraries in Kenya. Previous studies have captured few green initiatives such as green collections at the University of Nairobi in Kenya, but they

fell short of highlighting other green initiatives including those captured in this study. Future studies in the area could use the study as a baseline resource.

1.7.4 Architects interested in Ecological Solutions

According to Rohlf (1986), a common mistake in library design planning is to allow architects to create artistic impressions while disregarding opinions of key stakeholders like librarians. This study provides a library perspective to the green and sustainable library concept. Specifically, the study proposes a green library checklist that can be referred to by architects to ensure the building design of libraries with components such as intelligent building design, fat buildings, economic exteriors, atriums, large windows, zoning of lights and green roofs to be introduces so as conform to green library building standards. As such it could be of significant value to architects when planning for a green library building and green architectural design.

1.7.5 Library Users

Townsend (2014), notes that green library management gives emphasis to taking responsibility for the stability of nature and the health of library users. Findings of this study could be used not only to create awareness of environmental sustainability initiatives by libraries globally through its literature review, but it also proposes strategies for their effective implementation in libraries in Kenya thereby advocating and providing for sustainable healthy living and benefits for library users.

1.7.6 Library Parent Organizations

Institutions such as universities, research centers, schools, NGO’s and corporates that intend to set up green library buildings or to transform their libraries with green concepts will find the research beneficial. This is because the study provides a contextualized understanding of the concept and advocate for its implementation.

1.7.7 Certification Agencies

Libraries are an integral part of academic excellence in higher education and that is why most countries have regulatory bodies to offer certification to signify approval for infrastructure of institutional including libraries. This research will therefore benefit such agencies like Commission of University education (CUE) and International Standards Organization (ISO) by providing them an insight into the status of libraries in Kenya towards going green.

1.7.8 Professional Library Associations.

The national representing organizations for library professionals - the Kenya Library Association (KLA) and Kenya libraries and Information Services Consortium (KLISC) may use the findings on the status of environmental sustainability in libraries in the country variably. This includes determining and building capacity among its members; advocating and encourage libraries across the country who have not yet gone green to join the movement among others.

1.8 Scope of the Study

The study focused on Public, Academic and School libraries in Kenya. Specifically, it narrowed on the libraries' efforts, policies and practices that promote green library initiatives. The greening library initiatives considered were green buildings, environmental sustainability awareness programmes, water saving initiatives, energy-efficient lighting, optimized cooling, healthy air, insulating windows among other green library features over the past fifteen years. The targeted respondents of the study were the head librarians.

1.9 Limitations of the Study

A key limitation of this study was the inductive approach adopted in the study aims at exploring and explaining what is happening in a contextual manner. This means the results of this study are not to be generalized to other research settings or across the population engaged in going green for environmental sustainability. The scope of this study was not to critique the existing or lack of green initiatives in libraries but to assess the status in the participating organizations by identifying practices and strategies adopted and implemented and comparing them with the best practice in the global field. However, it is perfectly acceptable to make rational and logical inferences across the Kenyan library setting based on the results of this study and future studies in similar research settings to test the strength of the studies' conclusions.

1.10 Chapter Summary

This chapter provides a background on green initiatives implemented towards promoting environmental sustainability. There is a growing realization that humans were obliterating irreplaceable wastelands and endangering human health suggests the need for green campaigns along with sustainable solutions. The 'go green' movement emphasizes on creating a healthier atmosphere at home, public, community and even the workplaces to spur productivity and attitude amongst workers. Libraries are highlighted as important channels for disseminating and educating the community about responsible environmental practices. 'Go green' libraries improve internal environment in terms of quality through conservation of resources such as energy, water and paper and use of natural and biodegradable products and construction materials. Little is known about the green initiatives in Kenyan libraries. Very few libraries have adopted green initiatives in Kenya highlighting the possibility of lack of knowledge and appreciation of libraries role

in promoting environmental sustainability. Based on this view, this study investigated the adoption of green library initiatives in Kenya for environmental sustainability.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter provides the theoretical and conceptual frameworks, and literature review of past studies on green initiatives and strategies aimed at promoting green libraries and environmental sustainability. Past studies related to evolution of green initiatives, green movement for environmental sustainability, environmental sustainability practices in the library, green initiatives in libraries, and drivers and barriers of green library initiatives were reviewed in this section. This provided an in-depth understanding of the themes.

2.2 Theoretical Framework

Theoretical framework is the plan for an inquiry, serving as the guide upon which a study is built and supported. It offers the structure that outlines how a researcher will philosophically, epistemologically, methodologically, and analytically approach a study as a whole. The purpose of a theoretical framework is to ensure that research outcomes are meaningful and acceptable to the theoretical concepts in the research area and ensures generalizability (Adom *et al.,* 2016). A theoretical framework can have one theory or more than one theory that underpin the logic of a researcher on the subject of study, as well as the ideas and definitions from the theory, which are pertinent to the research subject (Osanloo & Grant, 2016).

A few theories have been developed to explain environmental sustainability, including, social norm theory, cognitive dissonance, elaboration likelihood model, theory of planned behavior, collective impact model and commons theory (Chambers, 2019). Most of these theories are general and cannot account for the adoption and implementation of environmental sustainability practices, which this study seeks to investigate. They also do

not explain the behavioral practices of green libraries as is proposed in this study. However, one model, one theory and one standard were deemed appropriate for this study, these are: the Norm activation model (NAM) that has been used to account for perceptions and comprehension for embracement and implementation of the going green concept; the Value-Belief-Norm (VBN) theory of Pro-Environmental Behavior that explains viable best practices of environmental sustainability that could be adopted by Kenyan libraries; and the United States Green Building Council Leadership in Energy and Environmental Design (USGBC LEED) standards that inform the best practice in going green and strategies applicable in green initiatives. These two theories and the standard are discussed in detail in the following sub-sections.

2.2.1 Norm-Activation Model

The norm activation model (NAM) was proposed and owned by Shahlom Schwartz and published in 1977. It explains altruistic and environmentally friendly behavior by individuals and organizations. The model explores the functions of anticipated pride and guilt in pro-environmental behavior (Schwartz, 1977). According to the author, in the course of a norm activation, first an individual becomes aware of an environmentally relevant problem and connects it with his or her own behavior. At this point, the influence of his or her own behavior on the problem is also evaluated and consequences of action determined. Additionally, the individual is closely linked to social costs of action which could be more than just judicial in nature.

The NAM poses different backgrounds to predict pro-environmental behavior which it recognizes as: awareness of consequences, personal norm, and acknowledgement of responsibility. Proponents of this theory like Stern et al., (1999) elaborate that norm activation commences with people's or organization's awareness of plausibly detrimental

consequences and their acknowledgment of responsibility for not acting pro-environmentally. As expected, pride and guilt causes individuals or institutions to act in a manner in line with personal norms. Stern (2000) asserts that environmentally significant behavior indirectly shapes the context in which choices are made to directly cause environmental change. Additionally, the NAM posits that there are behaviors that affect international development and environment policies which can have immense environmental impact indirectly than behaviors that directly change the environment.

Schwartz (1977), in his NAM l defines environmentally significant behavior by its impact, that is, the extent to which it changes the availability of energy from the environment or alters the structure and dynamics of biosphere and ecosystems. The NAM further ascertains that individual may significantly affect the environment through other behaviors, such as influencing the actions of organizations to which they belong. In reference to Schwartz's NAM, Savara et al. (2023) gives an example of architects and engineers being able to design buildings and manufacture products in more or less environmentally benign ways, accountants and contractors using or ignoring environmental criteria in their decisions, and public works handymen reducing the pollution produced by manufacturing plants or commercial buildings. He alludes such behaviors to the possibility of great environmental impact because organizational actions are the largest direct sources of many environmental problems.

The norm activation model speaks to the objective one of the study that sought to establish the perception of Kenyan librarians towards the concept of greening libraries for environmental sustainability. It also explains the second objective that assesses the greening methods/practices adopted by Kenyan libraries and objective four that proposes strategies to guide libraries in transforming into 'green libraries.' The NAM poses

different backgrounds to predict pro-environmental behavior among libraries which it recognizes as: awareness of green library concept, personal norm mirrored on the greening methods/practices adopted by Kenyan libraries, and acknowledgement of responsibility reflected on the responsibility of the library to establish strategies to guide libraries in transforming into 'green libraries'.

The Norm Activation Model is categorized in four different stages as defined in Figure 2.1.

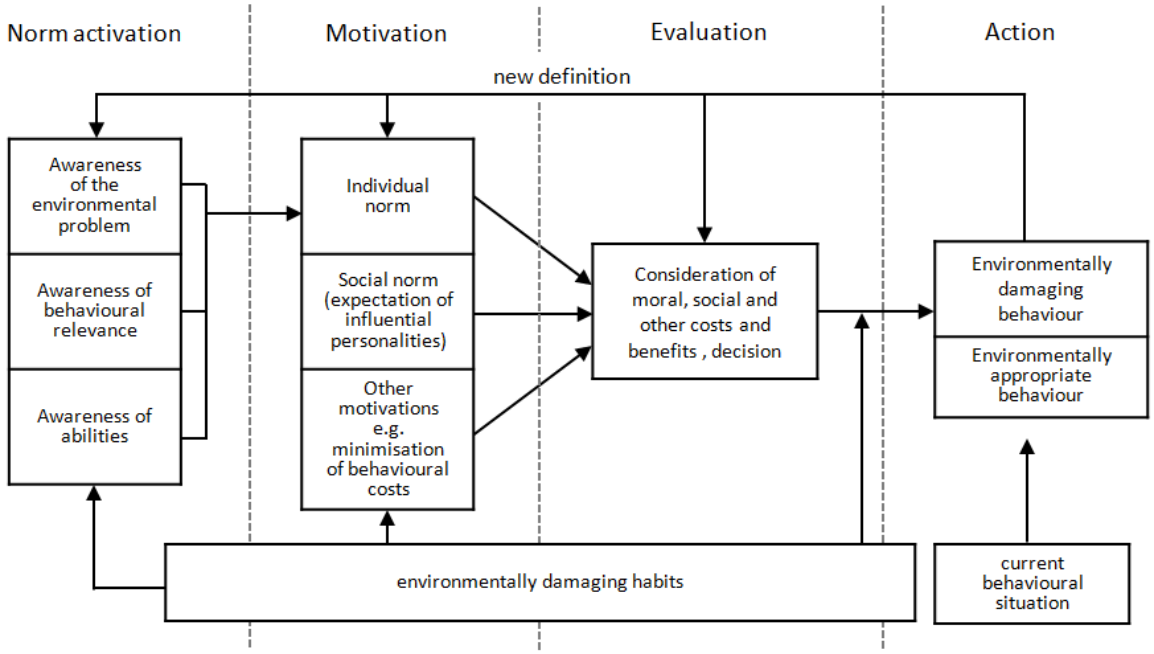

Figure 2. 1: Norm Activation Model

Norm activation as evidenced in Figure 2.1 begins with awareness of environmental problems, behavioral relevance, and abilities. Motivation which is the next step in the model can be individual, social or through other influencing factors such as minimization of behavioral costs which are environmentally damaging habits. The model also shows the aspect of evaluation where decisions, benefits, social, oral, and other costs are considered. The final step in the norm activation model is action which involves the stopping of environmentally damaging behavior, adopting environmentally appropriate

behavior and embracing a culture that depicts the current acceptable environmentally sustainable behavior.

The NAM model explains the first objective in this study. Pro-environmental behavior is depicted by an individual's perception about the environment. Positive perception reduces their destructive effect and inspires behaviors that promote the environment (Savari et al. 2023). With the NAM model, librarian perceptions are considered a function of personal norms, which are regulated by their knowledge and awareness about green library initiatives and its importance in promoting environmental sustainability. According to the NAM theory, perception and intentions begins at awareness of the consequences of a negative behaviors and attitudes towards the environment. Exposure to knowledge about green library initiatives and environmental sustainability leads to development of a sense of responsibility regarding promoting the environment, which is reflected through positive perceptions and intentions to promote initiatives (Kim & Hwang, 2020).

Green libraries are a new norm, they are perceived as a new library management thinking of acting towards environment sustainability, health of library patrons and personnel and providing for the needs and interests of tomorrow's generation (Datta, 2015). However as explained in the Norm activation model, it is not strange that it is taking long for libraries to be aware of the environmental problems, consider benefits of green initiatives and acknowledge consequences before they decide to adopt the concept of green libraries. This may explain why in Africa and Kenya in particular, libraries that are adopting green concept are countable. This study is however persuaded that by understanding the influence libraries have on environmental degradation, there would be more altruistic actions and environmentally significant behavior like going green in the region. Thus, this

study applies and is informed by the norm activation model on the choice of adopting green libraries for environmental sustainability in Kenya.

The norm activation model has also been used in a study of other sustainable library practices, for instance, Williamson et al. (2003) did a study on adoption of online databases in public libraries basing on the norm activation theory. They were able to prove the applicability of the theory in library innovation by identifying the factors that promote adoption of online database as well as the factors hindering the adoption of online databases. This research is thus anchored on the norm activation model conceptualized in Figure 2.1 to explore how green library concepts have been adopted amongst libraries in Kenya for environmental sustainability and the challenges encountered.

2.2.2 Value-Belief-Norm (VBN) Theory of Pro-Environmental Behavior

The Value-Belief-Norm (VBN) theory was proposed by Stern et al. (1999) to account for the effect of human values in an environmental context. The VBN theory states that pro-environmental behavior is predicted by personal norms, which are motivated by the acknowledgement of responsibility and the cognizance of consequences (Stern et al., 1999). According to Stern et al. (1999) people who adopt a social movement basic value, believe that valued objects are endangered, and their actions may enable restore those values. They experience an obligation, personal norm, for pro-movement action, which creates a disposition to offer support whose results is reliant on one's abilities and limits.

While explaining the relevance of VBN theory to green innovation, Joachim et al. (2015) presented that the VBN theory to explain that if altruistic norms and personal moral norms engrained on the aspiration for value, penetrate deeply in users, green consumerism and sustainability will be a key matter for people seeking new building or

office space as well as those renovating and retrofitting their building. This will equally increase the demand for green properties. This is consistent with the view that an increase in environmental consciousness as articulated by VBN theory could see a rise in owners and developers of pro-environmental beliefs that are based on altruistic or personal norms and values.

Proponents of VBN theory are convinced that individuals' subjective norms and normative beliefs regarding environment, influence their intent to behave ecologically. This proposition stem from an understanding that our environmental value can make us pursue green building. In another case Ghazali et al. (2019) found evidence that social norms predict pro-environmental behavior that include, activist, avoider, green consumer, green passenger, recycler, and utility saver. According to these authors, VBN informs the behavioral definition of environmentalism which is the propensity to take actions with pro-environmental intent. In the context of library green initiatives, environmentalism is the idea that flows from adopting a new environmental or ecological paradigm, within which librarians and architects' actions/designs and delicate environment is perceived as indistinguishably interrelated.

The Norm activation model, Value belief theory and systems theory speak to the first three objectives. The Green Building Rating standards (LEED) and national environmental policy in Kenya addresses the fourth objective on strategies to promote green library initiatives and sustainable development.

2.2.3 USGBC LEED Standards

The United States Green Building Council (USGBC) developed a standard rating system called Leadership in Energy and Environmental Design (LEED) in the year 2000. This standard was established with a view of helping organizations and individuals owning and

operating buildings to have environmentally significant behavior and to be economical and efficient in the use of natural resources. Rabidas (2016), elucidates that the LEED standard advanced from one standard on new construction to a comprehensive system of interconnected standards covering aspects on design, construction, maintenance, and operation of buildings. In 2020 the GBC global certification team certified 4,740 commercial projects and 24,000 residential units (2,326 projects) (Alexander, 2021). The LEED building design and construction standards as evidenced in Figure 2.2 has different aspects that are required for a building to be considered green. In this study the observation of green libraries was guided by the LEED v4.1 BD+C to establish what aspects of greening had been adopted by libraries in Kenya.

Water Efficiency	• Updates to Indoor Water Use Reduction recognize variations in standard supply pressure across the globe and the European product labeling program. • Cooling Tower and Process Water Use requirements are adjusted to be more relevant and achievable for projects; two new credit options incorporate a previous pilot credit and reward the use of alternative recycled water to meet process water demand. • Core and Shell only: Points are re-allocated from Indoor Water Use Reduction to Outdoor Water Use Reduction and Cooling Tower and Process Water Use to better align with Core and Shell scope of work.
Energy and Atmosphere	• The referenced standard for energy performance is updated to ASHRAE 90.1-2016; projects are now required to demonstrate performance against two metrics: cost and greenhouse gas emissions. • Optimize Energy Performance includes a new prescriptive option for individual systems optimization in BD+C. • Renewable Energy Production and Green Power and Carbon Offsets are combined into a new credit, Renewable Energy, to better address diverse methods of renewables procurement and evolving global renewables markets. • Demand Response is updated to Grid Harmonization to recognize role of buildings in supporting grid-scale de-carbonization; the new credit option rewards technologies and strategies for building load flexibility and
Materials and Resources	• To encourage greater uptake of all Materials and Resources credits, additional credit pathways and updated credit achievement thresholds are introduced for several credits, including Building Life-Cycle Impact Reduction and Building Product Disclosure and Optimization (BPDO) credits. • The credit category fine-tunes requirements with revised credit achievement thresholds to acknowledge variations for different project types and scopes of work. These updates include revised thresholds for number of products, cost and manufacturers in BPDO credits for smaller and/or less material intensive projects and project types such as Warehouses and Core and Shell to make credits more achievable. • The Construction and Demolition Waste credit is revised for challenging project sites and features updated total waste reduction thresholds. • Greater emphasis and weighting is given to embodied carbon reductions through building reuse, salvage, whole building LCA, and EPDs.
Indoor Environmental Quality	• The calculation methodology in the Low-Emitting Materials credit is restructured to be more straightforward and organized around product categories. The compliance thresholds have also been adjusted. • The air quality testing option for Indoor Air Quality Assessment has been revised with two testing pathways and a small list of required contaminants. • The entry points for both the Daylight and Acoustic Performance credits are lowered to encourage more projects to consider daylight and acoustic performance during design. Both credits also give more flexibility to the designer to appropriately address important design considerations: including excessive sunlight (for daylight) and sound transmission between spaces (for

Figure 2. 2: Highlights of the LEED v4.1 Building Design and Construction (BD+C)

A few highlights of the LEED scorecard are highlighted in table 2.1 below.

Table 2.1: Highlights of a sample LEED Scorecard

		New Construction	Data centres	Distribution Centers	Healthcare
INTEGRATIVE PROCESS		1			
Prerequisite	Integrative Project Planning and Design				
Credit	Integrative Process				
SUSTAINABLE SITES		11			
Prerequisite	Construction Activity Pollution Prevention	P			
Prerequisite	Environmental Site Assessment				
Credit	Protect or Restore Habitat				
Credit	Open Space				
Credit	Rainwater Management				
Credit	Light Pollution Reduction				
WATER EFFICIENCY		11			
Prerequisite	Outdoor Water Use Reduction	P			
Prerequisite	Indoor Water Use Reduction	P			
Prerequisite	Building-Level Water Metering	P			
Credit	Water Metering	1			
ENERGY AND ATMOSPHERE		33			
Prerequisite	Minimum Energy Performance	P			
Credit	Renewable Energy				
MATERIALS AND RESOURCES		14	13	13	19
Prerequisite Prerequisite	Storage and Collection of RecyclablesConstruction and Demolition Waste Management Planning	P P	P P	P P	P P
Credit	Furniture and Medical Furnishings				2
INDOOR ENVIRONMENTAL QUALITY		5	15	16	16
Prerequisite Prerequisite	Minimum Indoor Air Quality Performance Environmental Tobacco Smoke Control	P P	P P	P P	P P
Credit Credit	Low-Emitting Materials Construction Indoor Air Quality Management Plan				
Credit	Interior Lighting				
Credit	Daylight				
Credit	Quality Views				
INNOVATION		6	6	6	6
Credit	Innovation				
Credit	LEED Accredited Professional				
TOTAL	110 POSSIBLE POINTS				

The parts of the LEED Scorecard are broken down into 6 categories, namely, Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, Innovation and Design, and Regional Priority Credits (new for LEED v3.0). The point of the scorecard is for a Contractor, Owner, or Architect to use as a guide to the LEED Certification process. As the design team incorporates parts of the LEED requirements into the construction documents, the owner tracks the expected

credits to see where the project stands. It can also be a reality check for some projects with high hopes, but little ability to achieve the Platinum or Gold standards that most owners desire.

In as much as there are standards such the USGBC LEED, Green Mark, IGBC among others meant to guide green building initiatives, it is not clear whether there are any buildings in Kenya that are known to have certification. The study also sought to find out if there exists any local green building standard to spearhead the quality certification. This standard was used to inform the criteria for green libraries during the study. It checked the level of adoption of green initiatives in library buildings as guided by international standards of green buildings.

2.2.4 Systems Theory

Biologist Ludwig Von Bertalanffy introduced the systems theory in 1940s and argued for open than closed systems. According to Bertalanffy, open systems emphasized on interactions between systems and the environment outside the systems (Wilkinson, 2011). Organizations such as libraries are composed of many interrelated systems that work collaboratively to accomplish organization goals. The systems theory is important in creating insights on organizational behavior, change, development and practices. In this study, libraries are perceived to operate in instructional context and therefore comprises of subsystems that operate together towards achievement of the objectives of the library. The systems theory provides insights on the interaction and connection between the personal norms, beliefs and behaviors librarians and the library's culture of green initiatives.

The systems theory emphasizes on the sustainability aspect of the environment conservation phenomena in the libraries. The theory focuses on the internal factors such

as the attitudes and behaviors of librarians, and policies and practices developed to promoting environmental sustainability (Lai & Lin, 2017). Understanding the interrelationship between these factors in promoting green initiatives highlights the motivation and barriers of libraries in adopting green initiatives.

2.2.5 Legal and policy environment in Kenya

Various legislations and policies in Kenya are critical to promoting environmental sustainability and green initiatives. The Environmental Management and Coordination Act (EMCA) of 1999 provides the necessary framework for managing and conserving the environment in Kenya (Muigua & Musyimi, 2023). The National Environmental Management Authority (NEMA) is tasked with supervision, coordination and ensuring compliance with the provisions of EMCA in matters relating to the environment. The National environment Policy of 2013 strengthens the role of EMCA by providing a framework for an integrated approach to sustainable management and conservation of the environment in Kenya. The policy strengthens institutional frameworks of good governance and enables institutions such as libraries integrate environmental management in their business strategy to promote environmental sustainability (Muigua & Musyimi, 2023). The National Waste Management Strategy is another important sustainability instrument in Kenya that guides institutions like Libraries in creating healthy, safe and secure environments for all. The strategy provides a framework for deliberate and visionary commitment towards promoting environmental sustainability. The legislations and policies reflect the national strategy and responses to the environmental crisis phenomenon in Kenya and highlights their relevance to the green library initiatives.

2.2.6 Triangulation of the Study Models

This study was founded on one model, one theory and a standard rating system - The norm-activation model, the Value-Belief-Norm (VBN) theory of Pro-Environmental Behavior and the standard rating system referred to as LEED Standard. The norm-activation model explains altruistic and environmentally friendly behavior by individuals and organizations. Value-Belief-Norm (VBN) theory of Pro-Environmental Behavior accounts for the effect of human values in an environmental context. In this study the observation of green libraries was guided by the LEED v4.1 BD+C to establish what aspects of greening had been adopted by libraries in Kenya. Figure 2.3 illustrates the conceptual framework of this study by indicating the relationship of the variables under the study.

2.3 Conceptual Framework

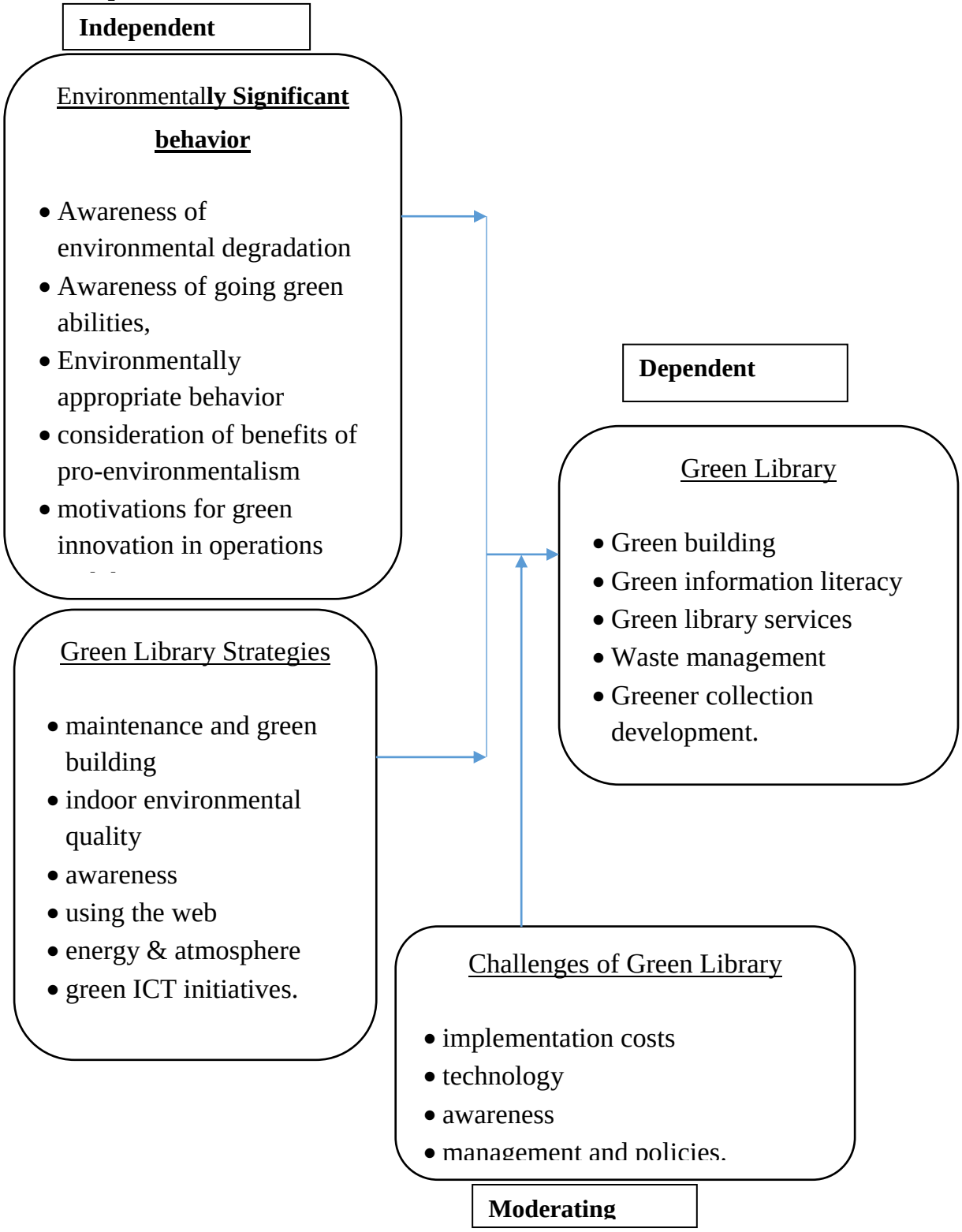

Figure 2.3: Conceptual Framework

The researcher conceptualized that green libraries are a result of library environmental sustainability practices and strategies that guide libraries in transforming. However, there are factors that impede libraries' embracement and implementation of the green concept and this affects the implementation of green libraries. Table 2.2 maps the study objectives to the theoretical framework of this study.

Table 2.2: A Mapping of the Study Objectives to the Conceptualization Framework

Objective	**Norm activation model**	**Value-Belief-Norm (VBN) theory of Pro-Environmental Behavior**	**USGBC LEED standards**
Establish the comprehension and perception of Kenyan librarians towards the concept of greening libraries for environmental sustainability	- Awareness of environmental degradation - Awareness of going green abilities.	- Environmentally appropriate behavior - consideration of benefits of pro-environmentalism - motivations for green innovation in operations and design.	N/A
Analyze the greening methods/practices adopted by Kenyan libraries	- Green information literacy. - Green library services. - Waste management. - Greener collection development	- Green building.	N/A
Determine the factors driving and impeding libraries' embracement and implementation of the green concept	- Implementation costs. - Technology.	- Awareness - Management and policies. - National environment management strategies and responses	N/A
Propose strategies to guide libraries in transforming to 'green libraries'	N/A	Strategies align with EMCA laws	- Green building - Green information literacy - Green library services - Waste management - Greener collection development.

2.4 Empirical Review

This section looked at past studies that have been done on adoption of green initiatives with a view to tracing the intellectual progression of the going green concept, including major debates. Interrogation of past research on green libraries was anchored on the conceptual framework of the study by critically examining the literature for similarities, differences, examples, trends, rejections among other analytical components.

2.4.1 Evolution of Green Library

The gradual development of green libraries dates back to the 1990's when libraries began to reduce their ecological footprint with the goal of contributing to a sustainable environment. The green library concept became so strong in the early 2000s and gained popularity in 2003 according to Walsh (2007). The TIME magazine writer Brian Walsh noted in his opinion piece that the tipping point was in 2007 as critical mass of society across the globe with an understanding of the existential threat of climate change was reached and most organizations begun taking actions to ensure sustainability and save the environment. As of today, the green libraries have been in existence for over 32 years, albeit more popular in some developed countries as compared to the other developing countries and less developed countries.

Authors like Hauke, Werner, and Latimer (2013) and Hauke et al. (2018) have tried to give a historical chronological account of the evolution of green libraries although with limited literature representing a global scale. According to Antonelli and McCullough (2012), libraries have been considered environmentally sound institutions from an early stage evidenced by the adoption of sustainable practices such as the multiple users usage of a single item. Dalbehera (2015) acknowledges that the preservation of resources over time immemorial are connected to the reuse and recycle components of green movement.

Over time libraries have also become flexible in nature due to adoption of new technology in response to environmental concerns.

Over the years, in the quest of becoming green, libraries have adopted resource recycling strategies and energy saving practices to recoup the tradition of sustainability. Antonelli and McCullough (2012) assert that having a green image allows a library to improve and strengthen its environmental consciousness. Other steps towards greening of libraries that have been adopted include locating the library building centrally in a densely populated area with easy transportation services (Hauke & Werner, 2013). Antonelli and McCullough (2012) emphasized on adoption of underground parking and vegetative roofs to reduce the heat island effect; water conservation strategies including collection of rainwater and use of waterless urinals and low fixtures. Pangil (2015) highlighted the use of glass technology to reduce the harmful effect of the sun's ultraviolet rays; and the use of solar energy and wind energy in an effort to conserve energy.

Similarly, structural designs of libraries are now consciously being considered along the going green concept. Some exemplary cases include libraries designs that ensure that air is recycled and does not remain stagnant to avoid entrapment of harmful toxins in the building (Antonelli & McCullough. 2012). Pangail (2015) examined the use of large windows to accelerate both sunlight and fresh air or the use of wide corridors to provide a buffer for entry of humid and hot air. Other studies have noted the use of environmentally friendly materials such as renewable materials like cork, bamboo, wood and linoleum to renovate existing libraries which are not green yet (Binks, Braithwaite, Hogarth, Logan & Wilson, 2014); and the continued incorporation of open spaces as well as potted plants which are ecofriendly.

Hauke and Werner (2013) in their book chapter *The second-hand library–a way of reducing the ecological footprint*, try to give insight on how libraries evolved from old buildings into sustainable libraries reducing the ecological footprint all over the world. They describe the process of re-using and recycling a building, which previously had a different function, into a functional library. The authors opine that the transformation of an existing building with a prior non-library function into a library provides the challenge and opportunity for sustainable thinking in library planning. This is a philosophy that gained traction over the years and many public and community libraries have come up as a result of green design thinking. There has been a decrease in non-renewable resources, and this has necessitated the increase in recycling and re-using of resources, so as to create a sustainable future. The ecological footprint or carbon footprint is reduced by green library buildings in an efficient and cost-effective manner. The best practice evidenced in green libraries across the world since the evolution of the concept includes recycled or sustainable building materials, solar power from photo-voltaic panels, green roofs, green information literacy, green collections, water conservation, energy conservation, indoor air quality, and adaptive re-use and new green library buildings certified by green certification agencies such as EDGE and USGBC LEED.

2.4.2 Adoption of Green Concept in Libraries

Global warming and climate change pose a challenge to the world with harmful consequences for human life. Implications urge to go green in all sectors of life including libraries (Asim & Ahmad, 2022). The green concept is now getting adopted by libraries across the globe as institutions commit themselves to reducing the environmental impacts through greening of libraries. According to Singh and Mishra (2019), the need for greener services to the environment is becoming increasingly necessary by each day. These authors acknowledged that libraries could lead to eco-friendly or environmental

sustainability through practices such as re-using and recycling of materials, reducing waste and toxic products and developing alternative technologies. Miller (2010), concurs and adds that the other ways that the greener concept in libraries is being embraced include, green building, green information literacy, green library services, waste management and greener collection development. These approaches are expounded on the ensuing paragraphs.

Asim and Ahmad (2022) carried out a study to examine the challenges experienced in the adoption of green library practices in Pakistan university libraries. The study adopted a scholarly literature review and qualitative research approach, and it involved literature reviews that entailed the challenges and dimensions of a green library in the global perspective. The study also engaged interviews on senior university librarians of Pakistan. The findings revealed that the challenges involved in green library practices adopted comprised a lack of awareness concerning green libraries and practices, and technologies for the paperless environments. The results also showed there is lack of policy for green libraries, a lack of awareness about the use of natural biodegradable products and construction materials, lack of awareness about the application of natural and renewable sources of energy, and seriousness of management and libraries. The study results recommended needed resources and skills to overcome the challenges including knowledge about green libraries and practices, space management, paperless environment, glass windows, solar panels, and skills about the utilization of renewable energy sources.

Further, Mwanzu (2022) conducted a study to examine the adoption of green concepts in Kenya based on environmental sustainability with a perspective to recommending approaches that may be applied to direct libraries in the adopting green change. This

study used a qualitative research design and involved a sample of 12 libraries from a population of 227 libraries in Kenya. The results revealed that Kenyan libraries have assumed benefit of their green concepts knowledge through adoption and executing green practices and devise strategies to improve green libraries and support environmental sustainability. The study concluded that librarians in the libraries of Kenya comprehend the green building ideas, have established various green initiatives due to reposition, and protect their position globally. The study recommended three approaches for fully moving to green library practices comprising active user engagement in green initiatives, enhancing performance, and development measuring metrics and sustaining green library standards.

Hussain and Ahmad (2021) carried out a study to explore smart library technologies model (green technologies and practices) and applications. The study adopted a qualitative research approach and engaged senior university librarians of Pakistan. The results showed that experts appraised smart library technology models as the best blend of associated technologies and usage. The results showed that each participating library was utilizing some of the smart library technologies model. The study recommended a move forward to overcome obstacles to adoption of the smart technologies model in Pakistan libraries.

4.2.2.1 Environmental Sustainability for Green Libraries

Studies have shown that awareness on the impact of libraries as organizations on the ecological footprint is one of the challenges for full adoption of green libraries. Stakeholders in the library including users need to appreciate the role of the library in a sustainable environment. Environmental sustainability seeks to improve the human welfare through protection of the sources of raw materials used for human needs and putting measures to ensure that human sinks for human wastes do not get exceeded. Singh

and Mishra (2019) define environmental sustainability by four specific criteria: regeneration, substitutability, assimilation and avoiding irreversibility. They point out that the aspect of regeneration entails using renewable resources efficiently and avoiding use that exceeds their long-term rate of natural regeneration. Substitutability is a situation where non-renewable resources are used efficiently, and their use is limited to levels that can be offset by substituting with other forms of capital or renewable resources. Assimilation on the other hand, is a situation whereby polluting substances or release of hazardous material in the environment is controlled to ensure it does not exceed their capacity to be assimilated. Irreversibility in essence relates to aspects of deteriorating the environment that cannot be reversed meaning once it is done it cannot be changed.

Environmental sustainability is often described as the "three-legged stool" – a balance of the environment, economics and social equity that must be achieved to be truly sustainable. Sustainable thinking for libraries can follow the premise that only by balancing our environment (facility and maintenance), economics (funding, budget, workforce development and local economic impacts) and social equity (access to knowledge, technology, providing a living wage to our workers and healthy workplace) will we develop the paths in our organizations to achieve sustainable funding, sustainable support in our communities and a relevant future. These paths can be in the areas of leadership and management, marketing, facility choices, programming choices and beyond (Hauke, Werner, & Latimer, 2013 p.17).

According to Choudhury (2013) going green in the context of environmental sustainability entails pursuing knowledge and practices that result in more environmentally friendly and ecologically responsible lifestyles and decisions. Dias (2017) observes that environmental sustainability in libraries serves as a way of

reinforcing principles and ethics which are followed by the library. Besides, it becomes a new vision for the public allowing an organization to be evaluated on its strengths, weaknesses, opportunities and threats to the organization (Dias, 2017). Environmental responsibility lies within libraries and is increasingly becoming essential to meet communities in their own vision of continuity.

Libraries have a mandate and opportunity to contribute to environmental sustainability. As a mandate, Antonelli and McCullough (2012) observe that libraries play a crucial role in the learning life of the community, and this makes it necessary to create libraries that provide environmental sustainability in addition to providing access to information. To this end, libraries are incorporating a variety of internal initiatives and methods that show their commitment towards being sustainable to their users (Townsend, 2014). As an opportunity, Townsend (2014) asserts that libraries have the chance of communicating the green identity through their operations and even design to address the effects of climate change and share application of environmental practices to increase environmental awareness among the librarians. Creating awareness among users, as Scherer (2014) observes, involves providing valuable information that explores environmental sustainability or through the use of existing green building features to help in leveraging awareness and learning on the issue.

Humans have a fundamental right to an environment that is adequate for their health and wellbeing, and this calls for commitment towards sustainable development to meet the present needs (Jankowska, 2014). As such, academic libraries are adopting environmentally friendly practices in their daily operations and services while striving to reduce carbon footprint and environmental waste (Antonelli & McCullough, 2012). Choudhury (2016) asserts that adoption of appropriate research, better designs and

delivery of services can be effective in reducing the time used by users thereby reducing the environmental costs.

Innovative communities are finding it crucial to promote climate friendly attitudes to ensure a future where its organizations will be more sustainable. As promoters of environmental awareness and key players, libraries are considered as having an opportunity of creating guidelines, using best practices to formulate positive action then is beneficial to the environment (Karioja & Niemitalo, 2013). However, libraries are cautioned to take certain controls in the process of promoting environmental sustainability. One proposal is controlling the costs to becoming energy efficient (Hauke & Werner, 2013). Another proposal is adopting strategies that are more efficient due to the reduction in time of access, processing and the improved access to information using low energy consumption devices among end users such as green information retrieval systems (Karioja & Niemitalo, 2013).

Even in digital information services, environmental sustainability remains a growing concern. Libraries are using modern technologies like cloud computing to reduce both environmental and economic impacts of digital information. McElrath and Sutherland (2015) note that the provision of information and data access through cloud computing technology is being promoted for its benefits of reducing environmental costs of information services. The use of cloud-based systems is now implemented to manage research information and data (McElrath & Sutherland, 2015) Using cloud-based information services contributes to the improvement of environmental sustainability of digital libraries. Chowdhury (2014b) asserts that digital libraries may be required to increase their investment in terms of resources to improve their usability and design and

this can be achieved through the adoption of technologies that lead to environmental sustainability.

4.2.2.2 Green Movement for Environment Sustainability

To validate the existence of the green movement in general, proponents have relied on the historical path that highlights the evolution and the activities that led to its formation. According to Encyclopedia.com the green movement emerged in the 1960s and 1970s. the movement advanced and grew because of popular and scientific concerns about local and global degradation of the physical environment. This source adds that the green movement is a diverse movement that forwards the concerns of environmentalists, otherwise described as persons who see the integrity of the non-human world as worthy of preservation both for its own sake and for the sake of human survival. The movement comprises scientists, political activists, rich and poor persons in all countries, and people with many different religious philosophies. The process of creating green libraries has also turned into a movement which is focused on promoting sustainability. Jankowska (2014) opines that it is necessary to recognize libraries as environmental consumers to allow identification of the amount of waste generated and the natural resources that a library building patrons and staff consume in a day. Adopting green initiatives requires outlining of metrics and indicators for addressing the three pillars of sustainability to determine the ecological footprint of an organization (Abbey, 2012). Such metrics have been used as the basis for making decisions concerning future services and operations, organizational sustainability and planning.

According to Antonelli (2008) the green movement comprises of libraries, librarians, towns, cities university and colleges that have a commitment towards greening libraries to allow a reduction of their environmental impact. Proponents of the green movement

assert that dealing with issues such as climate change, libraries must become sustainable. This process is described as involving the constructing of green library buildings based on LEED (Leadership in Energy & Environmental Design) performance standards (Barnes, 2012). Additionally, the green movement proponents observe that that the type of information program and resources provided to the communities by libraries is influenced by climate change and energy depletion (Hauke & Werner, 2013). So strong is this influence that Afacan (2017) concludes that the understanding of the existential threat of climate change has reached a tipping point making it common to everyone and evoking interest in measures to avert the situation.

A library movement has emerged from the behavior and idea of creating green libraries reaching the tipping point. It is said that this movement started in the early 1990s and gained popularity to a point that libraries have now embraced the concept leading to building of green libraries, provision of green library services, greening existing library facilities and embracing environmentally sustainable and supportive practices within libraries (Antonelli, 2008). According to Abbey (2012), interest in green library design has continued to intensify and city planners, architects and librarians continue to adopt the latest cutting-edge solutions in green library buildings. Collaborating this, Barnes (2012) asserts that the introduction of LEED certification system led it to be used as the national standard for institutional and commercial buildings. According to Barnes (2012), the use of this system allows the development of buildings that are designed, built, renovated, reused and, operated in resource efficient and ecological manner.

As a performance standard, LEED allows building planners and owners to choose how they meet particular benchmark numbers by adhering to specific measures (Barnes, 2012). Antonelli (2008) describes the point-based system used that allows a building to

earn LEED points for meeting the green building criteria. Six credit categories are assigned in a point-based system for new constructions based on how sustainable they are, water efficiency, innovation in design, material and resources, energy and atmosphere, and indoor environmental quality. A progressive rating system allows buildings to be categorized as either certified, silver, gold or platinum. The certification levels have 32 categories of energy concerns and environment designs for a maximum of 69 points. Qualifying for certification requires a building to score the minimum points that should be above standard building.

According to Abbey (2012) the push for building green libraries continues to grow with cities incorporating environmentally friendly practices in public buildings. The green movement has seen libraries adopt green features such as use of solar panels, bamboo wood flooring, natural day lighting, shading to filter direct sunlight among other features. Chowdhury (2016) attributes the adoption of green features in building of libraries to the perceived benefits such as reduced costs making them affordable. Chowdhury (2016) cites the example of The Delhi University Library in India that has incorporated the use of broad openings to allow natural lighting which brings a naturally cool and pleasant environment. The building has coolers made of pads from indigenous materials that helps to prevent the desert heat from coming inside. Besides, the library is covered with greeneries such as potted plants and trees inside and outside the library.

In Kenya, the USIU library has a library garden that has trees and plants to create a green environment and provide fresh air to staff and library users in the enormously large green building (Mwanzu, 2018). A flat roof allows harvesting of rainwater for watering the garden which gives the library an outdoor effect and ambience. According to Mwanzu (2018) the design of this library indicates that, the green library movement has been

embraced all over the globe and is now encouraging the greening of new library buildings.

2.4.1.1 Green Library Buildings

According to Antonelli (2008), one of the approaches being adopted is constructing green library buildings using performance standards such as Leadership in Energy and Environmental Design (LEED) to ensure green and sustainable library buildings. Binks et al. (2014) identifies that embracing green concepts involves designing, building, renovating, operating, and reusing the building in a resource efficient and ecological manner. Libraries are incorporating green cleaning and recycling programs, water-wise landscaping and green roofs to conserve resources and energy (Kurbanoğlu1 & Boustany, 2014). Library buildings are designed/redesigned in a way that reduces energy and water use and maximizes the use of natural and renewable resources. This study supports Antonelli's (2008) approach of identifying green libraries by using the USGC LEED standards as a checklist as earlier explained under section 2.2. However, the standard lacks Kenyan context specifications. The researcher intended to fill this gap by including in his observation checklist aspects that can inform the local environment regulation compliance so as to conclusively answer the objective of best practices in going green in Kenyan libraries.

In their study of "from green libraries to green information literacy" Kurbanoğlu and Boustany (2014), note that actual greenery and vegetation is also integrated in the building and site design. This involves the selection of native or drought resistant vegetation to maintain high standards of air inside the building thereby promoting the health of library users. Binks et al. (2014), while reporting on their study of "tomorrows green public library" emphasize that the use of large windows is adopted when building green libraries to allow in enough natural lighting during the day thereby reducing

reliance on artificial lighting. Heat island effect is reduced by implementing vegetative roof, shading hard surfaces, and putting them underground adds Stoss (2010). Green materials are also used in building flooring. These includes renewable materials such as bamboo wood, wood, cork, and linoleum. According to Pangail (2015), green library buildings are also designed to ensure efficient water conservation which includes use of waterless urinals and capturing and conserving of rainwater to irrigate the landscape around the library building. The researcher agrees with the arguments of Kurbanoğlu and Boustany (2014) and Binks et al. (2014) that incorporating green concept into library building promotes the health of library users and advance environmental sustainability. This study will attempt to shed more light on how libraries in Kenya have adopted greening concepts.

Various studies have examined the concept of green building and environment sustainability across various sectors in different countries. Weerasinghe and Ramachandra (2018) conducted a study to compare the LLC (life cycle cost) of green certified industrial manufacturing buildings with the same type of the traditional buildings to develop the green buildings' economic sustainability. The study adopted a comparative case study analysis and involved two green buildings and the same natured traditional building. Wei Hu, (2019) carried out a study to explore the position of the Chinese public's attention, transforming trends, sentiment orientation, and concentration towards green buildings in China. Alkaabi et al. (2020) conducted a study to examine the green-certified buildings resilience to uncertainty in the building systems' operation in hot environment of Abu Dhabi, UAE. Darko et al. (2018) carried out a study to examine and model the effects of different types of obstacles, drivers, and promotion approaches on green building technologies (GBTs) adoption in developing nations like Ghana. Olawumi and Chan (2019) carried out a study to examine and analyze the CSFs (critical success factors) that

may be amplified the incorporation of BIM (building information modeling) and sustainability approaches in building projects in the United States. Berawia et al. (2019) conducted a study to analyze stakeholders' knowledge of green building system in Indonesia.

Evidence from these studies is consistent with past literature on the importance of promoting green library building. The findings emphasize the attention of the public toward green buildings has improved substantially with the transformation of state governance concepts even though remain needs to be enhanced. Various strategies such as vertical greening buildings and solar photovoltaic technology having better thermal insulation and heat preservation. One study Beriwia et al. (2019) highlighted limited environment management knowledge and experience by institutions as key barriers to stable improvement in experts considering green building certification. Research and development (R&D), incentives and resources are recommended in addition to appropriate legislations and policies to promote green library buildings in public institutions such as libraries.

2.4.1.2 Green Information Literacy

Green information literacy entails expansion of the conventional information literacy to include sustainable thinking such as putting considerations as to how information choices, information behavior and information actions influence the environment (Kurbanoğlu & Boustany, 2014). The threat of environmental problems is communicated and addressed through sustainable thinking. Hauke et al. (2018), in a study on sustainable green libraries observes that achieving green information literacy entails incorporating sustainable thinking among the core component of information literacy. Hauke et al. (2018), adds that it involves making users conscious of how to go green when selecting searching, using, and communicating information. Kurbanoğlu and Boustany (2014) asserts that libraries

demonstrate to users the factual figures to draw their attention on the environmental impacts of their information actions and behaviors. Information literacy includes educating users on the environmental impacts of electronic sources versus paper, the use of information systems to increase their motivation and awareness enabling them to act responsibly when using information literacy skills (Feng et al., 2019). Notably, this allows libraries to transform towards green information literacy. These studies underscore the importance of awareness of green initiatives via green information literacy and these complement the objective of this study which sought to establish the comprehension of librarians in Kenya on the green library initiatives. This shed light on whether while adopting green libraries, librarians had green information literacy programs. The studies also relate to the NAM model and VBN theory that inform the current study on adoption, as they studied the variables in the model and the theory.

While reviewing studies on adoption of green initiatives, it was noted that different methods have been used to implement green libraries. Notably in a study on moving from green libraries to green information literacy, information literacy instruction is adopted as a method by libraries to promote the green library movement. According to the authors of the research, Kurbanoğlu and Boustany (2014), green information literacy involves using instruction sessions that embrace green practices and operations. The process entails using resources both energy and materials prudently and reducing the carbon footprints produced when carrying out instructional activities.

Feng et al. (2019), identifies the methods adopted by libraries to achieve this to include using both sides of the paper while printing or photocopying, reduced distribution of training materials which includes printing on demand and other printed materials. Other practices of improving green information literacy include switching off lights, computers

and monitors when not in use. Kurbanoğlu and Boustany (2014), assert that once green information literacy is achieved, individuals become aware of the impacts of their information behaviors on economic, ecological, and social systems leading to more ecologically responsible behaviors. Their findings affirm the Norm Activation Model and VBN theory that have been used in this study to inform the possible steps in adoption of green libraries.

The greening process has made libraries to start offering new services as they join the green movement. Various activities and services have been introduced in the efforts to create sustainable libraries. According to Chowdhury (2012), some of these activities include offering unusual and creative green programs to the communities to broaden their awareness by organizing educational outreach programs and workshops to teach green practices. Other information disseminated through these programs include information on environmental issues and green living such food security and recycling to enable others achieve greening of their operations, lives, and facilities (Antonelli, 2008). Libraries are also providing watt meters to users for them to check electricity usage especially from their electronic appliances (Kurbanoğlu & Boustany, 2014). The aim of providing this service is to create awareness among the people in terms of how much electricity they consume enabling them to reduce electricity footprint to become energy smart and save money. Several other studies Chowdhury (2014); Antonelli et al. (2008) and Kurbanoglu and Boustany, (2014) give insight on the best practice of pro-environmentalism in libraries. However, they fail to present the driving factors and impeding factors in the processes. This presented a gap that the researcher sought to fill by establishing best practices while also identifying positively or negatively influencing factors.

Other green library services offered by libraries as they embrace the green movement include offering green education to users. Mulford and Himmel (2010), opine that library is now offering information on how to grow food and on alternative medicines. Other libraries are creating community gardens for educating patrons on successful gardening practices (Connell, 2010). The Berliner Stadtbibilothek (a public library) and another community library that the researcher visited in Berlin, Germany for instance once had a campaign through their gardens doing this and they even provided users with tree seedlings for free in an effort to promote afforestation and reforestation. In some instances, libraries have maintained tool-lending and become archival depositories for genetic materials such as local seeds. Kurbanoğlu and Boustany (2014), note that such services are aimed at promoting ecologically responsible practices among the people in the community to reduce the environmental impacts through sustainability. Nonetheless, the researcher notes a gap whereby there is no significant study indicating whether these methods are being adopted in Africa and more so Kenya. He intends to fill this knowledge gap by identifying the methods used in going green in Kenyan libraries.

Priti and Rajani (2021) carried out a study to explore the significance and background of environmental literacy and the way academic libraries may be environmental educators on shifting towards green. The study adopted a quantitative research design and involved libraries in the US. The study results revealed that academic libraries may disseminate information concerning environmental protection and educate their users to play a critical role in sustainability activities to protect the environment. Green libraries feature the environmental factors of the building's structure, facilities, and green practices. Nonetheless, shifting to green in libraries may not necessarily imply building a new design to incorporate green surroundings. In addition, libraries can study existing facilities and buildings that made be made sustainable by moving towards green and be

the model for educating the importance of environmental sustainability to improve environmental literacy.

Fedorowicz-Kruszewska (2020) conducted a study to explore the concepts associated with environmental education in the perspective of sustainable developments. The study used literature analysis using multiple case study approach. The findings of confirms the presumption that sustainable development is the new approach of librarianship. Environmental goals are one of the sustainable development goal, which libraries may be attained via environmental education. A wide approach to environmental literacy has been recommended, which is executed by utilizing library services and building green collections contacts with environmentally engaged librarians, utilizing ecological library infrastructure, considering sustainable management approaches in libraries, cooperation between the external atmosphere and library based on the natural environment.

Thrishala (2019) carried out a study to identify the effect of green information literacy of library employees to formulate green idea in the library. The study adopted a qualitative research design and involved library employees in Sri Lank, SLIDA library. The results of this study showed that the library employees have a great concern on the idea and what they must do in the library to attain the institutional green goal. The library follows several green practices among, and this has become a dominant aspect, which improve their green literacy and enthusiasm of them. The study results also showed that the green information literacy level among the library employees was in a satisfactory level because they adhere to the green policy whereas practicing green models in the institutional premises and library environment. Therefore, all the aspects highlight that the green information literacy unswervingly influence the green movements within the library.

2.4.1.3 Waste Management

Waste management is one of the practices adopted by libraries that intend to move towards the green concept. Rickert (2019), observes that libraries deal with a lot of paper which leads to generation of large amounts of solid wastewater and air pollution during paper production. Libraries have adopted the practice of recycling office papers and discarding newspapers to manage paper waste. Rickert (2019), identifies that this approach helps to reduce the number of trees cut down to make paper thereby reducing both water and air pollution. The process of producing paper also uses a lot of energy and electricity, and recycling can help to reduce the carbon footprint while reducing the amount of wastepaper by reusing. Finally, Rickert (2019), concludes that recycling helps to make libraries greener by reducing the amount of waste they deposit to the environment which promotes sustainability and greening. This study identifies a gap in Rickert's research where it is not clear whether waste management has been adopted as a library policy or just a greening method. It would be prudent to establish whether libraries using waste management as a method of going green have also laid out policies guiding staff and users on the same. The current study therefore sought to fill this gap by interrogating policies in place to inform best practices in going green.

Laser toners and cartridges are recycled in an environmentally and economical way. The practice reduces the chemical waste and plastics produced by libraries, which promotes healthy environments (Rickert, 2019). Managing waste in a green way also includes adopting the strategy of purchasing recycles printer cartridges for use in libraries. According to Binks et al. (2014), the green movement also advocates for the treatment of black water which mainly comes from toilets and kitchens. Embracing of the green concept involves adopting treatment of wastewater which is done biologically or mechanically before such water can be reused for either watering plants or lawns around

the library (Binks et al., 2014). Notably, this helps to reduce the amount of water used in the libraries and promotes sustainability by ensuring natural resources are used efficiently. The researcher acknowledges the best practice in going green as opined by (Binks et al., 2014; Rickert, 2019) and in a quest to further their studies, he sought to establish whether libraries in Kenya have any other best practices in going green particularly regarding for instance water harvesting or recycling.

Kiplagat et al. (2017) conducted a study to examine the state of electronic-waste management at Egerton University Library for the aim of supporting safe and conducive working environment for students and the staff. The study adopted a quantitative research design and engaged students and the staff of library in Egerton University, Kenya. The results showed that e-waste generation is inevitable; therefore, libraries and information centers and electronics users should look for a proper framework that guarantees effective and efficient management of all e-wastes that arise from their operations. This study recommended sustainability helix framework that demonstrates a detailed response for addressing issue of e-waste in libraries. The framework shows that top management support is vital and a formal e-waste policy adoption that could initiate guidelines for accountable e-wastes' management from all premises.

Furthermore, Esmaeiliana et al. (2018) carried out research to examine the potential of smart cities and linked communities in supporting waste management efforts. The study employed literature review analysis and engaged over 200 publications in waste management in smart cities. The findings showed that the recommended framework outlines the product lifecycle data value in minimizing waste and improving waste recovery, and the urge for linking waste management approaches to the entire product

lifecycle. The study recommends an example of utilizing data sharing and tracking technologies for examining the waste management problems.

Some studies have provided a connection between waste management and institutional policies and practices. Horvath et al. (2018) found that a holistic business strategy was important in enhancing the sustainability of the waste management practices in organizations. Saeed et al. (2018) found that adoption of green HRM practices positively influenced employee behavior and attitude towards waste management. In addition, the study found that promoting employee environmental knowledge on waste management moderated the influence of green HRM approaches on their pro-environmental behavior and attitudes. Ansari et al. (2020) corresponded this view and concluded that green human resource management (GHRM) influenced positive employee commitment and pro-environmental behaviors.

2.4.1.4 Green Collection

A study on public libraries going green shows that some libraries intending to become green developed green collections, and this involved selecting materials whose content informs and assess green practices, selecting materials whose format generates less carbon dioxide emission and adopting a deselecting process that emphasize recycling and reuse of materials (Kurbanoğlu & Boustany, 2014). According to Kurbanoğlu and Boustany (2014), the process of developing green collections involves adding green resources that address issues such as green computing, environment, organic gardening, and energy consumption among others. These materials are added to the library's collection of books, DVDs, reference works and websites to facilitate access to green information. Connell (2010) observes that outdated and worn-out library materials are weeded through the process of green deselection that involves reusing and recycling the

weeded materials. The practice of recycling weeded, and unneeded printed resources is adopted ad a standard green practice.

Cornell (2010) asserts that green collection development starts with librarians educating themselves about green practices, green programming materials and green collection resources. Some libraries have started to offer online classes to teach about the green library. Librarians also gather green information for the patrons to allow building of a green emphasis across the curriculum (Cornell, 2010). Adding review articles that focus on green resources to the library collection is another step taken to develop greener collections. Some institutions are working closely with local schools to support green projects and curriculum such as models of ecosystems and murals. Cornell (2010) identifies other activities adopted by to develop greener collections to include using green resources and using green topics and resources as the basis for information literacy instructions and publishing reviews of green resources in newspapers and campus newsletters. While the researcher agrees with these authors' perspectives on adopting green initiatives through green collection development, he seeks to also establish the perspective of librarians in Kenya including their comprehension of the green initiative especially since Kenya, like many other African countries is not well documented in terms of green libraries.

Younghee and In-Ja (2018) carried out a study to measure eco-friendly aspects on the factors of library service, materials handled or provided by the library and programs comprising educational programs in China. The study used a quantitative research approach and engaged workers of the libraries. The results showed that many agreed that green library's collection establishment is necessary. In addition, the results revealed that the collection of green libraries are most significant in energy, indoor environment, and

prevention of environmental pollution, and resources and material. The study results served as the basis for data collection for the guidance of establishment for green libraries in the country and the reference for the libraries' workers in remodeling or constructing library buildings, developing service infrastructure, offering information service, and planning responsibilities of libraries in an eco-friendly manner.

Institutional policies and practices can play a vital role in enhancing green collection. This view is consistent with the findings presented by Babak et al. (2020). Their study examined the mediating of HRM practices on the association between green collections and sustainable organizational development. The findings identified nine dimensions of HRM practices that contributed to green collection in organizations. The dimensions included design and analysis of green jobs, green HR planning, green selection, green employment, green performance assessment, green reward management, green training of labor force, green safety and health management, and green discipline management improves transformations in sustainable development of an organization.

2.4.2 Sustainability in Libraries

Sustainability entails ensuring the preservation of natural resources for the future, meeting the community needs and living in a carbon-neutral manner to ensure that the needs of future generations are met (Binks et al., 2014). According to Barnes (2012), sustainability also entails creating and maintaining conditions under which nature and humans can exist in productive harmony and one that permits fulfilling of economic, social and other requirements of both the present and future generations. In the context of libraries, Antonelli and McCullough (2012) notes that sustainable libraries encompass improved day-to-day operations and procedures, design and refurbishment of the library buildings. The underlying principle of sustainability as postulated in the above statements is well

articulated by Binks et al. (2014). These authors assert that the fundamentals of sustainability include incorporating the aspects of reducing use, re-use and recycling when it comes to operations to reduce the impact on the environment. It is therefore reasonable to conclude that the principle of sustainability is beneficial given that sustainable buildings are less costly to operate and maintain than non-sustainable buildings.

Understanding sustainability leads to strengthening of the processes in which the society gets transformed based on the ideals of sustainable development. However, as Chowdhury (2014) rightfully observed, achieving the three forms of sustainability, that is, social sustainability, economic sustainability and environmental sustainability is challenging given that measures adopted to achieve one type of sustainability tend to affect the other forms of sustainability. Chowdhury (2014) explains that sustainability, in the context of green libraries, entails having resources that facilitate the integration of social, environmental and economic integration.

Years back, Binks et al. (2014) shared their optimism of public libraries becoming environmental leaders in the community by committing to the future through creating long-lasting buildings using sustainable designs. According to these authors, sustainable development calls for a balance between social equity, economic growth and ecology to meet the needs of the present without compromising the ability of future generations meeting their own. Chowdhury (2014) observed that the growth in information needs, the evolving information and communication needs and the growth in operation costs in libraries called for long term social, economic and environmentally sustainable development planning. Jankowska (2014) argues that although libraries strive to meet the

needs of their users, they struggle with ongoing costs of collection, utilities, equipment and buildings.

Collaborating Binks et al. (2014) perspective of environmental sustainability in the context of sustainable development entails using resources and interacting with the natural world in ways that do not reduce the available resources to future generations, Jankowska (2014) identified green practices of ensuring sustainability in the environment. These include reusing, recycling and, minimizing pollution in the mitigation of use of finite resources. Sustainable development in this context involves taking environmental issues into account when making decisions.

The target of economic sustainability is to ensure, easier, cheaper and better access to digital information. Achieving this type of sustainability requires adoption of a sustainable business model and taking measures to reduce the creation, distribution and access of information (Choudhury, 2013). In addition to these, we could add reduction of the efforts and time used in discovery access and use of information.

It has also been established that social sustainability seeks to ensure equitable access to information to promote building of healthy and well-informed societies. Choudhury (2013) for example, demonstrated how sustainable development can lead to the achievement of social sustainability through adoption of measures to increase usability and accessibility. Drawing from these observations, we can expect that social sustainability efforts would notably increase the impact of libraries in every sphere of society.

2.4.2.1 Environmental Sustainability Practices in Libraries

The increasing threats from environment degradation have pushed libraries to consider environmental sustainability issues in their practices. According to Singh and Mishra

(2019) libraries have integrated green practices to safeguard the environment through their green library initiatives. Karioja (2013), identifies a four-step program used in a library to enhance environmental sustainability. The first step involves informing patrons of the library's dedication to environmental issues. The second step is enabling easy access to environmental information for instance shelving all eco-related books into one shelf and at the same place availing brochures on environmental issues. The third step is arranging for events on environment. The last step is setting a good example to other libraries that more libraries can consider themselves as green and affect the opinions of customers and policymakers. Some of the environmental sustainability practices in the library include sustainable sites for library buildings, water efficiency, energy efficiency, sustainable materials and resources, indoor environmental air quality, innovation in operations and design and raising awareness of sustainability issues. These are discussed in detail in the following paragraphs.

Beutelspacher and Meschede (2020) carried out a study to examine the German public libraries' status and their efforts geared towards a sustainable community. The study adopted a quantitative research design and engaged library staff in German public libraries. The study results revealed that most libraries support environmental sustainability by outlining books and other media on many sub-topics via special shelves or conventions. In addition, libraries arrange many information events. Hence, collaborations with other institutions and schools are of great significance. Besides these endeavors, there remains potential to support environmental sustainability despite lack of personnel and budget challenges.

Further, Moura (2017) conducted a study to investigate on environmental sustainability practices in public libraries in Portugal. The study adopted a quantitative research

approach and involved libraries in Portugal. The findings showed that there are a growing number of green libraries across the world that uses environmentally sustainability standard in their management and strategic action. The study noted that seminars, conferences, and emerging academic research recommended revision of the academic curriculum in LIS (Library Information Science). The study found that library professional associations globally are establishing working groups and support debate on the global library and environmental sustainability.

Singh and Mishra (2019) carried out a study to discuss the role of green services, which are integrated within libraries to attain environmental sustainability. The study used a quantitative research approach and engaged libraries in India public universities. The study results revealed that there are different sustainable strategies for libraries to apply in their operations, for example, green copying and green printing. The study findings concluded that the negative effect of new technologies on the environment increases the need for green services in libraries and decreasing the carbon footprint that can automatically improve environmental sustainability services, a credible move for improving society's lifestyle.

Baden et al. (2020) performed a study to examine the efficacy of expanding the library idea to comprise more items like those that are utilized infrequently. The study used a multiple case study approach and engaged six LoTs (Libraries of Things) in the United Kingdom (UK). Results show that all LoTs have common social and environmental values, with the most dominant values being to utilize the library idea to minimize resource utilization and wastage, and to support equitable access to products. All depended on public transport and volunteers, although none were financially self-sufficient.

2.4.2.1 Site Selection

Building of environmentally sustainable libraries requires proper selection of the site with consideration of the impacts it will have on the environment. Site selection is crucial as it determines how ecologically friendly the building will be. Rabidas (2016), emphasizes that libraries are now incorporating site selection in building sustainable buildings by locating the building in densely populated areas or near other related buildings. This ensures that people can access the building using public transport. According to Fresnido and Esposo-Betan (2017), considerations made include the impacts that the building will have on the local environment including whether it will contribute to erosion, how storm runoff can be utilized and whether the site is already green. McElrath and Sutherland (2013) note that buildings tend to create the heat island effect, and this is reduced by implementing a vegetative roof, shading hard surfaces, or putting them underground. He adds that the site is selected in such a way that the rainwater is used to sustain the green roof which allows absorption of solar energy to reduce the heat island effect.

Bangar (2018) conducted a study to examine conditions of green library, characteristics of green library, role of a librarian in India. The study adopted literature analysis and engaged literature reviews associated with Green Library movements and Green Library. The results showed that as per the LEED –India based on the green design elements, it gives guidelines for the site selection and maintain that proper site location is a vital element for the library construction. The results revealed that people must be able to access the building through public transportation and the parking lots must provide priority to those driving energy efficient automobiles. Findings also revealed that libraries must be located in areas that are densely populated and close to several other service associated buildings.

Saha and Padhan (2019) carried out a study to explore the overview of the technical green libraries' development for academic institutions in United States based libraries and other developed nations such as India, Canada, and UK. The study adopted multiple case analysis and engaged a number of libraries in the United States. The findings showed that the green library building structure should first select a site because it has a large influence on how environmentally friendly the library will be to the users. In addition, the results revealed that a library must be situated in a densely populated area and users can reach the building with ease.

Massardier-Pilonchery et al. (2019) carried out a study to describe levels and conditions of exposure to radiofrequency electromagnetic fields in the real-life occupational circumstances of those people working in the media libraries and conventional libraries. The study adopted a quantitative research approach and analyzed use a sample of 28 library employees. The results showed that median individual exposed to Wi-Fi frequency waves varied from 0.005 to 0.040 V/m. The study concluded that the occupational exposure in the library sector was approximately to the exposure in the public. The study concluded that exposure because of external sources relied on the geographical location of the library.

2.4.2.2 Water Efficiency

Growing water demand and water scarcity have turned into a prominent challenge to livelihood in several parts worldwide. Global warming has aggravated the issue of the water crisis. According to the UN-Water (2019) policy brief the global warming crisis is increasing variability in the water cycle, thus reducing the predictability of water availability and demand, affecting water quality, exacerbating water scarcity, and threatening sustainable development worldwide. These impacts disproportionately affect the developing countries with the majority of the poor and vulnerable communities and

are compounded by contributing factors, including population increase, unmanaged migration, land-use change, reduced soil health, accelerated groundwater extraction, widespread ecological degradation, and biodiversity loss (UN-Water, 2019). In an earlier observation Cassardo (2014) had concluded that one of the most urgent challenges facing the world today is ensuring an adequate supply and quality of water in light of both burgeoning human and ecosystem needs and climate variability and change. Variations in evaporation and precipitation patterns due to climate and land use changes, as well as increasing water usage to meet human needs, are fundamentally changing the availability, quality, and timing of water across the globe.

Water scarcity is expected to affect socio-economic activities, food security, education, health, and intensity climate change, hereby has caught the attention of library institutions (Mulwa, Li, & Fangninou, 2021). The United Nations Sustainable Development Goal (SDG) 6, Clean water and sanitation, sets various targets to make water sustainable for use by the year 2030. However, water scarcity assessment remains a challenge. Kenya, which has a growing population, is known as a water-scarce country due to its low supply of renewable fresh water. Different initiatives are put in place to help in the mitigation and management of water resources key among them is rainwater harvesting that library buildings can take up (Mulwa, Li, & Fangninou, 2021).

According to Fresnido and Esposo-Betan (2017) Water Efficiency in green libraries is achieved by taking advantage of the rainwater and designing the roof to capture it which is then stored and used in flush fixtures within the building. Harvested rainwater can also be used to water lawns around the libraries as well as potted plants which are placed inside the library building. Cheng et al. (2016) assert that buildings are also adopting the technology of building waterless urinals to reduce the amount of water used in the library

buildings. Wastewater is minimized by utilizing water conserving fixtures and adoption of bidets in place of toilet papers to increase the possibility of re-using water on site (Cheng et al., 2016). Antonelli and McCullough (2012) note that grey water and non-sewage water is used for onsite use such as irrigation to minimize demand for water. Besides, plants that are used in the library and the landscape around the library and green roofs include regional, local, and adapted plants that do not require irrigation. This study seeks to establish the water efficiency methods used in Kenyan libraries.

Mehta (2018) conducted a study to examine the concept, object, and requirement of green libraries and supports existing libraries going green in India. The study adopted a literature review analysis and multiple case studies in the US. The results showed that when a site is chosen properly strategies may be applied to capture and conserve rainwater, rainwater runoff to be applied in irrigation. In addition, results revealed library has to utilize waterless urinals and low flow fixtures.

Kumar and Sofiya (2019) conducted a study to explore the green concepts in the Thiruvananthapuram library buildings by the major areas listed by LEED (Leadership in Energy and Environmental Design) like site location, water conservation and materials. The study adopted a quantitative research design and engaged a sample 259 users of libraries in India. The results showed that KN Raj Library has a system of rainwater harvesting and State Central Library has a system of waste management. In addition, the study revealed that the green concepts in Trivandrum libraries are adopted at a moderate rate.

Singh and Mishra (2021) conducted a study to identify environmental sustainability practices vital for library environmentally sustainable in Uttar Pradesh, India. The study adopted a quantitative research approach and involved a sample of 22 library employees

across four central universities of Uttar Pradesh. The findings showed that most libraries in the universities practice water conservation practices such as monitoring facilities for consumption of water, installations of the systems of rainwater harvesting, efficient systems of plumbing, and utilization of sprinklers. Further, results revealed that they use practices such as installation of water reuse systems, utilization of rainwater, and use of waterless urinals to save water employed in the toilet.

2.4.2.3 Energy Efficiency

Globally, the increased demand for energy is a common problem for all kinds of libraries. Energy consumption and saving, one of the first things that come to mind in human-environment interaction, have shaped the perception of green libraries (Singh, & Mishra, 2021). Lowering energy demand and related costs is a particular concern due to the libraries' long operating hours. Lack of energy and an increase in the use and cost of energy and water are among the major challenges in the green library initiative (Asim & Ahmad, 2022). According to Azizi et al. (2015) green buildings often fail to achieve optimum energy efficiency performance. When calculated, the actual energy consumption is different from that predicted at design stage. In some cases, more energy is consumed in green buildings in comparison to conventional buildings of the same size and function. This is because the building operators do not operate the buildings as intended, and because occupants sometimes behave differently than expected. Research showing poor performance of green buildings impedes the rate of implementation of green buildings (Azizi et al., 2015).

Library buildings are adopting various measures to promote environmental sustainability as a way of becoming sustainable. Binks et al. (2014), identifies some of the practices adopted to include the use of energy efficient lighting and climate control systems as well as use of renewable sources of energy. These strategies are implemented to enable

libraries to reduce the cost and consumption of energy to promote environmental sustainability. According to (Binks et al., 2014), the use of renewable sources provides libraries with a cleaner way of meeting their energy needs thereby reducing the use of non-renewable sources such as gas and coal. The above is in line with the USGBC LEED standards and these provides a good baseline for recommending strategies for pro-environmentalism in libraries in Kenya.

Solar panels are now installed on libraries to generate electricity thereby reducing the demand for conventional energy resources making its use more cost effective in the long run. The use of natural lighting is another practice adopted by libraries to reduce the use of lighting and use of electricity during daytime (McElrath & Sutherland, 2013). Library buildings are now built and renovated using green concepts that includes installation of large window panels to increase the amount of natural light in the building (Hauke & Werner, 2013) The walls and windows are oriented in such a way that allows maximization of solar gains. Increased natural lights eliminates the need for artificial lighting in library building which reduces the carbon footprint (Fresnido & Esposo-Betan, 2017). Solar water heating is also adopted to reduce energy loads while solar energy is utilized for onsite generation of renewable energy. It will be imperative to determine whether libraries in Kenya are adopting solar energy for and natural sunlight as alternatives for electricity needs. The study is informed by the USGBC LEED standards which also use solar adoption as criterion for determining green building certification.

Hashempour (2018) performed a study to examine influence and significance of lighting systems within the interior design of school libraries in Istanbul, Turkey. The study adopted a quantitative research design and involved school libraries in Istanbul. The results showed that use of proper lighting system is critical for the library success. In

addition, the findings revealed that a well-designed system of lighting in the libraries guarantee a bright, comfortable, peaceful, or exciting environment for library users. Singh and Dixit (2021) performed a study to identify sustainable strategies that have been applied by the chosen State Universities Libraries of Lucknow, Uttar Pradesh, India. The study adopted quantitative research designed and engaged library staff in selected State universities libraries in Lucknow. Findings showed that RMLNLU Central Library applies natural ventilation and acoustic management components such as sunlight and natural temperature controls. KGMU and RMLNLU library building utilizes solar energy showing they embrace energy efficiency in their operations.

2.4.2.4 Renewable Construction Materials

There is a growing concern of environmental sustainability. Especially with the issue of global warming caused by human activities such as industry and the use of construction materials that are not renewable. All of that has an impact on global warming which is dangerous to environmental sustainability. One of the solutions is to reduce the impact of global warming and to apply the concept of use of renewable construction materials that are sustainable (Suhamad, & Martana, 2020).

Building materials are considered to be green if they are rapidly renewable such as bamboo, straws or lumber from forests that are managed sustainably. According to Suhama, and Martana (2020) in the building, environmentally friendly materials (also known as green building materials) are materials that used for the production, placement, and maintenance. They should be durable, reusable or recyclable. It includes materials that can be recycled in their composition and must come from the resources in the area where the construction activities will take place. These materials also should be natural (land, adobe, wood, cork, bamboo, straw, sawdust, etc.) and must not be damaged by cold, heat or moisture. Meher and Parabhoi (2017), identifies the other sustainable

materials used include recycled stone, ecology blocks, baked earth, and other non-toxic, renewable and recyclable materials. Where possible, the building elements should be manufactured offsite and delivered to minimize waste and maximize recycling, less noise and dust (Fresnido & Esposo-Betan, 2017).

2.4.2.5 Air Quality

Indoor environmental air quality entails ensuring that the building is constructed in a way that provides comfort, productivity, and well-being of occupants. Fresnido and Esposo-Betan (2017) opine that the strategy focuses on reducing volatile organic compounds and other air contaminants which include air impurities. Building relies on systems that ensure adequate air filtration and ventilation and use of materials that have zero or low emission to improve internal air quality. According to Rabidas (2016), sustainable library buildings are designed with proper ventilation to make them cool and prevent harmful toxins from being trapped inside that can cause issues such as skin irritation, nausea, and fatigue. Ensuring proper ventilation helps to eliminate volatile organic compounds which can be harmful to library users if they get trapped in the building (Rabidas, 2016). The design needs to ensure that air does not stay stagnant, but it gets recycled given that a green library also entails taking care of the wellbeing and health of the users.

2.4.2.6 Building Massing

Library buildings are now built using designs that reduce the use of energy especially in terms of lighting. Kutt (2018), identifies strategic building orientation and massing as one of the practices adopted to ensure environmental sustainability through climate control systems and use of lighting systems. Libraries are utilizing the design of building massing which focuses on the overall shape and size of the building (Meher & Parabhoi, 2017). The approach entails adopting designs that make the most of natural lighting thereby reducing reliance on artificial lighting. Buildings are oriented to utilize the sun’s path at

the building site (Rickert, 2019). Notably, this is to ensure that the building captures enough light at any time of the day. Antonelli and McCullough (2012) notes that building massing is also employed when designing libraries to influence other essential elements such as acoustics and harvesting of rainwater. This can be done by having flat roof tops to increase the surface area for collection of rainwater.

2.4.2.7 User Awareness

Libraries have a role of raising awareness on the issue of climate change to promote environmental sustainability by educating the community about green practices. According to Datta (2015), libraries are implanting the convention of eco-friendly libraries by inviting users to take participation in the green movement. Niegaard (2013) notes that librarians are also organizing conferences, workshops and in-house displays in libraries to showcase and popularize the idea of going green to increase awareness. Datta (2015) observes that, updating collections to include publications and implementing program that are relevant to going green has also helped to increase awareness of environmental sustainability. Much as I agree with all these researchers' perspectives and findings on some of the documented environmental sustainability practices in libraries in the world it is imperative to carry out a study and establish whether these practices are applicable in the Kenyan context and if so to determine any driving factors or impeding factors that may influence the adoption of green initiatives. These will further result in recommending strategies that are relevant to the Kenyan library context and also best practices that may be used as benchmarks.

2.4.3 Drivers and Impediments of Green Libraries

The environmental issues are crucial in the construction industry and this makes sustainable construction to be essential to reduce impacts on the environment. According to Antonelli and McCullough (2012) implementing green concept entails adopting green

designs and specifications in the construction projects such as those that have been subjected to environmental assessment. There are driving factors that influence the rapid growth of the green library movement such as the United Nations Sustainable Development Goals and the 2030 agenda for sustainable development. Various barriers have been identified to hamper the embracement of green concepts by libraries and these include technical issues, policy and economic factors (Stafford, 2010). The pace of action in adopting green initiatives is dependent on the knowledge, consciousness and understanding of the consequences of individual actions. The main driving factors and barriers have been categorized into three fundamental aspects, which include technology, awareness, management and policies.

2.4.3.1 Technology

The adoption of the green technology in construction is another barrier that hinders the implementation of green concepts in libraries. Shi et al. (2013) asserts that incorporating green construction techniques can bring issues in the architectural design of the building such as installation of solar water heaters and panels which may increase the time spent during integration with the materials used on the roof. According to Shi et al. (2013), the use of large areas of single layer glass curtain walls which cannot resist strong solar radiations in hot weather and low temperatures during the cold seasons tends to increase the power needed for air conditioning to regulate the indoor temperature. Green materials and equipment are essential in the construction of green buildings but the uncertainty of their performance leads to reduced efficiency of green construction (Lam et al., 2010). Applicability of new technologies and products is limited, and this may force the practitioners in the construction to move back to traditional construction methods when building libraries.

The lack of mature green technologies due to misunderstandings on the operations and requirements for implementing green constructions is yet another barrier to implementation of green concepts (Shi et al., 2013). Niig (2016) asserts that green buildings involve high techniques which may not be available in some countries such as those in the initial stages of implementing green developments. Besides, some green technologies are not easy to come by especially in developing nations. The risk and uncertainty associated with effectiveness and reliability of new products prevents professionals from specifying green buildings. Lam at al. (2011) also emphasize that green technology is associated with risks and uncertainty, and this is an important factor for consideration when adopting green concepts. Shi et al. (2013) asserts that the risk adversity is responsible for the low enthusiasm towards the embracement of green concepts. Notably, this makes embracement of green concepts to be difficult when building libraries due to uncertainty in terms of how the green technology works (Niig, 2016).

2.4.3.2 Awareness

Awareness of green concepts is closely related to the public awareness of the environmental issues. Hasan and Zhang (2016) notes that the knowledge and cognition on sustainability of all stakeholders including designers, policy makers, the public and the construction personnel needs to be enhanced further. According to Niig (2016) the public is aware of various environmental issues such as pollution which they identify as a serious issue, but they rank government involvement and public indifference with higher priorities. Civil engineers have not played their role in ensuring that they have enhanced the awareness of policy makers, librarians, and the public on both the costs and benefit associated with green designs (Hasan & Zhang, 2016). In developing countries practitioners in the building industry such as architects, contractors, and interior designers

are also either unwilling or slow to change the conventional ways and processes of doing things. This can be attributed to lack of awareness on the potential benefits.

Lam et al. (2010) identifies the lack of knowledge on the durability of green materials and green technology as significant barriers for implementing green strategies in the construction of libraries. The uncertainty on the performance of materials may also be a reason for rejecting the use of green materials which could result in increased testing fees and maintenance costs.

2.4.3.3 Management and Policies

Libraries in developing countries are often poorly adapted to environmental policies. University libraries had been reluctant to establish their sustainability indicators or accept those of other organizations. There was no policy or recommendation on waste management and environmental strategy for library collection (Asim & Ahmad, 2022). The adoption of green concepts is dependent on the level of support given by the library's senior management. Employees at the lower levels have little impact to the implementation of green strategies if the top management is not committed to the environmental sustainability (Hasan & Zhang, 2016). The knowledge of green technologies and the durability of green materials are identified as the main barriers that lead to resistance by management when it comes to implementing green strategies. According to Hasan and Zhang (2016) the management may also not support green projects due to the lengthy planning and approval process for recycled materials and new green technologies.

Another challenge to the implementation of green buildings is the insufficient efforts to implement policies. Zhang, Shen, Wu and Qi (2011) note that project managers may have the willing ness to introduce green elements, but they experience the barrier of having

little power given that the local policies and regulations allow fewer green options. According to Zhang, Shen, Wu and Qi (2011), the lack of enough policy or regulations at hand makes contractors tasked with building or renovating library buildings to avoid taking the risk of implementing green initiatives. Commitment and guidance from the government can help to motivate and drive libraries to adopt green strategy.

2.4.3.3.1 Implementation Costs

Cost implementation is an important aspect of cost management in the designing of sustainable and green building. The cost of green buildings is more expensive than general buildings. This is as a result of incorporating of green building systems such as energy-efficient appliances, equipment, and lighting. They increase the construction costs by 10.77% compared to traditional buildings (Kim et al., 2014). Substitutes of wood such as compressed wheat board costs more than ten times of the ordinary price of wood. High costs are incurred when searching for green alternatives during certification of buildings and this contributes to the high-cost premium of constructing green buildings (Stafford, 2010). Cost effectiveness is one of the considerations for implementing green constructions and this makes the extra cost incurred to be a fundamental barrier to adoption of green concepts by libraries. According to Shi et al. (2013), utilizing green techniques such as energy and water saving equipment, high performance insulation protection increases the capital cost.

Cost control and management of green building costs has been identified as one of the major barriers to the implementation of green practices (Shi et al., 2013). Green buildings also result in increased cost due to delays during integration of green construction, sustainable technologies and, interactions with other components of building. According to Bhattacharya (2017) other entities find the construction to be affordable due to availability of funding, but libraries face the challenge of cost when meeting green goals.

This is notably due to being subjected to stringent budget cuts especially when it comes to reconstructing or reengineering library buildings and structures.

2.4.3.3.2 Universal Environmental Protection Campaigns

Quite a few campaigns have been the driving force for environmental sustainability in libraries. The American Library Association (2015) noted that the library ought to be stakeholders in pro-environmentalist by virtue of being a focal point to the society and community. Public libraries, which are often considered as community centres of information and learning, can spearhead environmental sustainability awareness campaigns while also practicing pro-environmentalism in the library buildings.

Sonkkanen et al. (2013), while reporting on green library projects in their countries illuminate the role libraries can play in support of the Sustainable Development Goals (UN SDG's). They emphasize that there are several activities that can be taken up by libraries to protect the environment. Aytac (2019), also highlights certain driving factors in his study while benchmarking and reporting on library environment sustainability progress. He notes that the IFLA declaration and demand for libraries to be co-custodians of the UN SDGs provides a perfect stage for libraries across the world to identify, emulate and adopt environmental sustainability activities, procedures and projects that can form part of their work plans, strategies and general activities.

Some of the documented campaigns for environmental sustainability include but are not limited to UN SDG's, IFLA Green Library award, IFLA Environment Sustainability in libraries special interest group. In regard to standards, there is the USGBC LEED, IGBC among other country standards for green buildings in Europe, Australia, Canada and Asia. The researcher in the current study acknowledges the presence of these campaigns and standards as driving factors in the embracement and implementation of green library

initiatives but also questions the efforts being made to ensure operationalization of projects, procedures and activities from the campaigns.

2.4.4 Strategic Transformation to Green Libraries

In the wake of environment degradation there is need for every institution in the society to take initiative in environmental sustainability. McElrath and Sutherland (2015) argue that in light of the seriousness of global warming and climate change effect across the world, there is need for green libraries that can strategically apply environmentally friendly policies and practices. Some of these environmental practices that are associated with green libraries, strategic practice that can help transform libraries to green libraries include, maintenance and green building, hardware, special events and projects, awareness, using the web, networks and green ICT initiatives. These are discussed in the subsequent subsections.

2.4.4.1 Maintenance and Green Building

Transforming libraries to green libraries involves undertaking of steps which include adaptation or renovation to reduce environmental impacts without necessarily building a new library (Kodnikar et al. 2018). Renovation includes redesign or design to include air conditioning systems, and this involves selecting equipment that utilizes solar energy and takes advantage of the local climate conditions. Kodnikar et al. (2018) notes that maintenance practices that focus on transforming libraries to become green libraries include turning down the heat by one or two degrees or taking advantage of windows instead of using air conditioners.

The library building can also be reinsulated using recycled paper to control heat in the building. According to Meher and Parabhoi (2017), paper insulation is effective as it also helps to make a building environmentally friendly while protecting the walls from insects

and fire. Bamboo can be used to replace steel given that it is renewable and has limited effect on the environment. When cleaning, it is necessary to switch to safe cleaning products to reduce the impacts of cleaners on the environment. Datta (2015) asserts that artificial lighting during the day tends to increase energy consumption in the library building and librarians can supplement the use of normal bulbs with eco-friendly light bulbs to reduce energy use. Some libraries have installed solar panels to reduce energy consumption by utilizing renewable solar energy.

2.4.4.2 Hardware

The rapid manufacture and consumption of computers is causing an environmental concern due to the amount of energy and other resources that are utilized during the production process. Rickert (2019) notes that most of the old computers end up in landfills and recycling is made hard due to the presence of different types of plastics which is time-consuming to sort. According to Rickert (2019), discarded computer screen contains high amount of lead which can cause various health issues. Libraries are now buying refurbished computers to reduce the number of computers discarded as electronic waste. Another approach is buying recycled toner cartridges for the printers at the libraries to reduce environmental impact and promote reuse and recycling (Datta, 2015). Desktop computers tend to consume a lot of power to run as compared to laptops and some libraries are replacing desktops computers to reduce their energy use. Libraries are also purchasing duplexers for their printers to enable printing on both sides of the paper to reduce the use of printing papers (Rickert, 2019). Utilizing both sides of the paper helps to reduce the number of papers used while increasing the efficiency in use of resources to promote sustainability.

2.4.4.3 Special Events and Projects

Libraries can transform and become green libraries by adopting special events which include environmentally related theme events and weeks. The use of energy meters can aid to increase awareness by enabling people to monitor energy consumption to take the right measures to reduce energy usage (Datta, 2015). As has been established in the previous discussion, some of the special events that libraries are engaging in to become green includes the adoption of the green movement. Others include collaborating with the green certification organizations to accelerate the adoption of green practices, restorative projects to reduce ecological deficit, environmental management plans, environmental impact management, recycling contests, putting up displays on how the library is reducing its carbon footprint, applying for grants form organizations that are actively involved in environmental conservation for funding of green projects and renovations of buildings among others valued to library users as a step towards growing the Green Library Movement (Binks et al., 2014; Karioja, 2009; Townsend, 2014).

This study appreciates the knowledge shared by these authors as strategies for going green and embracing environmental sustainability practices. These together with the well documented standards will form the basis of the observation checklist which is one of the instruments that will be used to explore the adoption of green libraries. Findings on the practices and strategies that libraries in Kenya are using to adopt environmental sustainability were analyzed and also compared to the ones listed above to determine similarity and also any possible best practice strategies that can be recommended as part of the study objectives.

2.4.4.4 Awareness

Raising awareness of the environmental issues is crucial to ensuring that the greening practices are supported by every stakeholder. Bhattacharya (2017) asserts that awareness

leads to collaboration between the local community and the member of the library when designing and implementing sustainable practices that establish a green library culture. Involving all stakeholders allows them to have vested interest in the common goal and this enables members to act purposefully which increases learning through participation (Bhattacharya, 2017). Having a shared and solid vision supports the continuation of green efforts after the redesign of the library facility and the continued awareness encourages team learning. The approach upholds the value of green libraries by fostering awareness of environmental sustainability. Purohit (2017), notes that awareness is also achieved through cooperation with unpaid partners such as NGOs, library suppliers and library users to promote the idea of green library. Practices adopted include the use of environmentally friendly or recycled materials resources saving copy services, virtual users' services, waste separation, green events and choosing suppliers with green certificates.

These studies anchor well with the theories that have been chosen for this study that is the NAM and VBN theories. This is because they clearly spell out the steps for influencing behavior of pro-environmentalism which in turn enhance green library transformation. This study sought to add on to the knowledge shared by authors by establishing awareness of green libraries by librarians in Kenya while exploring adoption of green library initiatives. The findings together with the information provided in the reviews above were used to develop strategies that can be used by other libraries in going green.

2.4.4.5 Using the Web

The use of web is another approach that libraries use to become green and this includes creation of an online catalogue to cut down on paper by moving it online where it can be easily accessed (Hauke, Grunwald & Wilde, 2014). Updates are also now mailed through emails instead of mailing using paper newsletters when keeping in touch and announcing

special events. According to Hauke, Grunwald and Wilde (2014), archives are also digitized and moved online to help preserve the original newspaper and magazines. Memos and reminders are also sent using online services instead of using sticky notes and papers. Datta (2015), notes that the use of Facebook allows patrons to keep in touch and interact on various issues affecting the library. Blogs are also essential in spreading awareness on the libraries green activities.

The researcher agrees with these views by researchers that highlight the web as a major method of going green and reducing carbon footprint. However, it is not known whether libraries in Kenya utilizing the web as a source of information are specifically doing so to reduce carbon footprint and as an alternative to print material or environmental sustainability was not in mind while these procedures were being put in place. The study helps to fill this gap by establishing possible strategies that libraries can adopt while aware of environmental sustainability practices.

2.4.4.6 Networks

Libraries also network with organizations focused on environmental sustainability to advance the green agenda. Some of these networks include: the Tree Hugger which focuses on educating about the latest trends in green buildings, food, design, technology and travel; United Nation Environmental Programme (UNEP), a network that focuses on ecosystem management, resource efficiency and climate change among others. The National Resource Defense Council, a network that helps to tackle issues such a s green living, environmental policies and global warming; Earth 911, a network that allows libraries to get their patrons involved in the site and gain skills on how to recycle different materials and aids in locating recycling centers in the area (Datta, 2015).To add to this knowledge of networks being used to advocate for going green, this study established the

existence of other strategies involving advocacy by pro-environmentalism agencies to influence adoption of green libraries.

2.4.4.7 Green ICT Initiatives

In the spirit of reducing energy consumption by libraries, librarians are adopting various ICT initiatives such as shutting down Desktops at the end of the day and reducing the cooling in the data centers to the right levels (Datta, 2015). Power management software's help to automatically power off desktops after 9 pm if they are left on. Datta (2015), in his study on bringing libraries to the green scene adds that e-waste is affected using systematic disposal to reduce the waste generated by libraries thereby leading to the adoption of green computing. He categorically calls this move "from black to green".

McBane and Himmel (2010), also note that teleconferencing has been adopted in some libraries to reduce air travel for library staff thereby reducing the impact of air pollution caused by aircrafts indirectly by a fraction. They add that the policy of work anywhere is implemented to enable location independence and flexible working. The researcher in the current study however does not agree that reducing air travel for staff should be a strategy for going green. This is because most travels are planned for and are most likely aimed at adding value to the institution for instance through networking, resource mobilization or popularization. Additionally, teleconferencing is ideal as an alternative strategy for lack of funds to travel. If all libraries adopted it as a going green strategy, then other areas of library development would also suffer for example, policy formulation during international library forums, international benchmarking of services and projects in libraries, library peer exchange programs etc. The researcher in the current study will identify and recommend strategies that are not only practical but also non-deterrent to library development.

2.5 Chapter Summary

The literature review reveals the increasing threats from environment degradation have pushed libraries to consider environmental sustainability issues in their practices. However, while libraries out in the developed countries are effectively implementing green library practices, the concept is less understood and less embraced in Kenya. The green library standard lacks Kenyan context specifications that would fit the local libraries. Cost control the management of green building costs, has been identified as one of the major barriers to the implementation of green practices. Green buildings result in increased cost due to delays during integration of green construction, sustainable technologies and, interactions with other components of building. Lack of mature green technologies is another barrier to implementation of green concepts. The current study intends to look at strategic practices that can help transform libraries to green libraries.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The environmental changes in the world that are as a result of population growth and human activities are changing the world in ways that are threatening the existence of life on earth. Evidence shows that this threat of environmental changes is bound to increase in the coming years if additional proactive actions are not taken. This study sought to explore the adoption of green library concepts in Kenya for environmental sustainability. The study objectives were to establish the comprehension and perception of Kenyan librarians towards the concept of greening libraries for environmental sustainability, analyze the greening methods/practices adopted by Kenyan libraries, determine the factors driving and impeding libraries' embracement and implementation of the green concept, and propose strategies to guide libraries in transforming to 'green libraries.

This chapter discusses the research methodology that was employed in the study. It discusses the research design, study population, sample and sampling technique, and data collection procedure. Additionally, it explains the development of instruments used, reliability and validity of the instruments including the methods of data analysis, research ethics and administration of the instruments.

3.2 Philosophical Perspectives of Research

Saunders, Lewis and Thornhill (2016) define research philosophy as a set of beliefs and assumptions on the development of knowledge. They articulate beliefs about the nature of reality, what can be known about it and the approach for attaining this knowledge (Rehman & Alharthi, 2016). Philosophical stance of research therefore explains a researcher's perception of reality (ontology), what they consider as acceptable, valid and legitimate knowledge (epistemology)and how they handle their own values and those of

their research participants, that is, the role of values and ethics within the research process (Axiology) (Rehman & Alharthi, 2016). Collectively, these assumptions influence the method (methodology) through which one carries out the research (Rehman & Alharthi, 2016).

Table 3.1: Philosophical Stance of the Study - Interpretivist Research

ASSUMPTIONS					
Epistemology	Implication in the study	Ontology	Implication in the study	Axiology	Implication in the study
Knowledge is based not only on observable phenomena, but also on subjective beliefs, values, reasons, and understandings. Knowledge is about the way in which people make meaning in their lives, not just that they make meaning, and what meaning they make.	Most appropriate in drawing a clear understanding of the adoption of green library concepts in Kenya. The researcher relied on quotes as evidence from respondents and spent time with participants.	Based on the perception of the subject affected by the research problem rather than objective truth. The researcher reported different perspectives as themes developed in the findings.	Different respondents in this study interpreted green libraries in different ways based on individualism, in knowing about the subject of green libraries	With interpretivism perspective, researchers tend to gain a deeper understanding of the phenomenon and its complexity in its unique context instead of trying to generalize the base of understanding for the whole population.	The researcher openly discussed the values that stage the narratives and included his own interpretation in conjunction with the interpretation of the respondents.

3.2.1 Ontology

Ontology refers to the nature of human beliefs concerning reality (Richards, 2003). In carrying out a research, scholars have assumptions about reality, its existence and what

can be understood about it. It is the ontological question that leads a researcher to inquire what kind of reality exists (Rehman & Alharthi, 2016). The two main paradigms in ontology are subjectivism and objectivism.

In this study, subjectivism ontology was adopted. Subjectivism works on the presumption of individualism. It emphasizes the role of knowing a subject which means that different interpreters can interpret the conduct of the other party in different ways (Janeþková, 2003). Subjectivism holds that the researcher and the societal phenomenon under study are mutually interrelated and dependent (Amakiri & Juliet, 2018).

There are two assumptions underlying subjectivism perspective are upheld in this study. First, is that facts are based on the perception of the subject affected by the research problem rather than objective truth; and secondly, that in subjectivism perspective, the researcher is inclined to the idea that conclusions are derived from the interpretations of the participants rather than the abstract theories of the researcher or scientist.

The implications of subjectivism ontology on this study are that different respondents interpreted green libraries in different ways based on individualism, in knowing about the subject of green libraries. Case study research strategy was preferred for the study so as to understand the different interpretations based on individualism to know about the adoption of green libraries in specific libraries. Interviews, observation and document review were the preferred data collection methods used so to determine what kind of reality exists as per the ontology paradigm of subjectivism. Finally this ontology assumption influenced the use of thematic analysis as the prefered data analysis method to demistfy that facts are based on the perception of the subject affected by the research problem rather than objective truth; and secondly, that in subjectivism perspective, the

researcher is inclined to the idea that conclusions are derived from the interpretations of the participants rather than the abstract theories of the researcher.

3.2.2 Epistemology

Epistemology refers to the assumptions that researchers make about the kind or the nature of knowledge or how it is possible to find out about the world (Al-Saadi, 2014). It defines what knowledge is considered valid in research, and therefore what constitutes acceptable sources of evidence and acceptable end results of knowledge (Amakiri & Juliet, 2018). This study took interpretivism perspective. Interpretivism adopts an approach to acquire knowledge by developing an understanding of phenomena through deep-level investigation and analysis of those phenomena. It does not claim generalizability of outcomes, but rather provides results that are limited to a certain context (Mc Manus et al., 2017). With interpretivism perspective, researchers tend to gain a deeper understanding of the phenomenon and its complexity in its unique context instead of trying to generalize the base of understanding for the whole population (Pham, 2018). This perspective thus appeared to be the most appropriate in drawing a clear understanding of the adoption of green library concepts in Kenya. The research assumed that different libraries practice differently the concept of green library.

In relation to the epistemology assumption, the researcher considered it most appropriate in influencing the choice of interviews as a data collection instrument where the researcher relied on quotes as evidence from respondents and spent time with participants to understand their perception of the green library phenomenon. Epistemology assumption in interpretivist approach also guided the study to adopt a qualitative research approach and descriptive research design so that the researcher can develop a clear

understanding of the green libraries' adoption phenomena in Kenya through deep-level investigation and analysis of those initiatives in place.

3.2.3 Axiology

Axiology refers to what a researcher believes is valuable and ethical. Basic beliefs about what is ethical are embedded in research paradigms and guide the researcher's decision making. The goal of the research needs to be in line with what the researcher values as well as other ethical considerations in doing the research (Killam, 2013). This study took an Interpretivism Axiology. Qualitative research draws from interpretivist paradigms, looking to get a comprehensive knowledge of a research problem instead of predicting outcomes. Interpretivism seek to construct knowledge from comprehending people' unique perception and meaning linked to these perceptions (Tomaszewski, Zarestky, & Gonzalez, 2020). In interpretivism, scholars recognize that they, along with their study participants, co-construct findings that are socially situated but may be transferable to similar contexts (Allen, 2017). Interpretivism was thus the most appropriate in drawing a clear understanding of the comprehension and perception of Kenyan librarians towards the concept of greening libraries for environmental sustainability.

The implications of axiology assumption on this study are that the researcher openly discussed the values that stage the narratives and included his own interpretation in conjunction with the interpretation of the respondents. Case study research strategy was preferred for the study so as to understand the different interpretations based on individualism to know about the adoption of green libraries in specific libraries. Interviews, observation and document review were the preferred data collection methods used so to determine what kind of reality exists as per the ontology paradigm of subjectivism. Finally this axiology assumption influenced the use of thematic analysis as

the prefered data analysis method to clearly discuss narratives and include the researchers own interpretation.

3.3 Research Approach

Research approach is the plan and procedure for a study, which spans the decisions from broad assumptions to detailed techniques of data collection and analysis (Creswell & Creswell, 2017). The study investigated green and environmental sustainability practices in selected academic, public and school libraries in Kenya. Since the study involved getting comprehensive information on library operations and details of the buildings in relation to green and environmental sustainability practices in selected academic, public and school libraries in Kenya, it was appropriate to use the qualitative research approach. Qualitative research involves the collection the views and perspectives of individuals to drawn deeper insights into the phenomenon. Creswell and Creswell (2017) stated that qualitative research relies on observations and individual perceptions to draw meaning to the phenomenon. Investigating the adoption of green library initiatives in Kenya requires direct interaction with people directly involved in environmental sustainability to create insights about their understanding of green library initiatives and its association to environmental sustainability. A qualitative approach was appropriate for this study because it allowed the researcher to interact directly with librarians, management of libraries and local environment management authorities to gather insights on their perception and comprehension of green library initiatives, associated benefits and motivations to adopt them in libraries in Kenya. The in-depth insights create an understanding of the adoption of green library initiatives in Kenya and make recommendations to improve adoption of the initiatives in Kenyan libraries to enhance environmental sustainability.

3.4 Research Strategy

A research strategy provides an overall direction of the research including the process through which research is carried out. There are a number of research strategies including, case study, experiment, survey, action research, grounded theory and ethnography (Wedawatta et al., 2011). This study used a multiple case study strategy, which provides a holistic and in-depth explanation of the phenomenon being investigated (Robson, 2002). Adopting multiple studies in a single study allows the researcher to explore complexities and investigate multiple dimensions and perspectives of the phenomenon. Adopting multiple case studies in this study allowed the researcher to gain in-depth and broader understanding of the green library initiatives phenomena from different perspectives and uncover underlying benefits, barriers and motivations driving the initiatives. Brink (2018) argued that multiple case study approach broadens discovery and generate adequate data related to the phenomenon to sufficiently address the research question. The case studies provided rich data to address the study's research questions adequately.

3.5 Research Design

Research design refers to the overarching plan for linking the conceptual research problem to the applicable and workable empirical study. The need of a research design is to transition a study problem into data for analysis in order to offer appropriate answers to research questions at minimum cost (Asenahabi, 2019). This study used a descriptive research design. Descriptive research design seeks to describe a phenomenon and its characteristics. Descriptive research is more concerned with what rather than how or why something has happened (Nassaji, 2015). Therefore, observation and survey tools are often used to gather data. In this study interview guide and observation checklist were used to collect data. Descriptive research design was employed as it enabled the researcher to attain the essential knowledge of green library implementation among

Kenyan libraries. The design enabled the researcher to systematically gather participants' perceptions, views and opinions about greening library initiatives and characterize the phenomenon. This allowed in-depth analysis of the participants' perceptions and views of the phenomenon to inform on the adoption of green library initiatives in Kenya libraries, in addition to offering a significant knowledge to subject of green library for further scrutiny (Mills et al., 2010).

3.6 Study Population

There are three kinds of population in a study. Asiamah et al. (2017) identifies these as general, target and accessible population. The general population is the entire group about which some information is required to be ascertained. Target population is the group of persons or participants with the specific attributes of interest that is of relevance to a study. The accessible population is the population in research to which the researchers can apply their conclusions. This population is a subset of the target population and is also known as the study population. It is from the accessible population that researchers draw their samples.

Based on Asiamah et al. (2017) categorization of population, the general population for this study was all library staffs in Kenyan libraries. The target population was around 227 professionally qualified head librarians in Kenyan Libraries. The considered libraries were:

i. Five public University libraries, namely, University of Nairobi Graduate Research library, Kenyatta University postmodern library, Moi University Margaret Thatcher Library, Masinde Muliro University and Embu University Libraries
ii. Three private chartered University libraries namely

The Catholic University of Eastern Africa, United States International University – Africa and Adventist University Library

iii. Two Public libraries namely, Kenya National Library Service- Upper Hill and Kenya National Library Service- Nakuru

iv. Two School and Special libraries, that is, Mpesa Foundation Academy library and International School of Kenya library.

This population in these libraries was targeted because it informs the development of the various libraries in the country and offers valid, informed responses and opinions which are relevant to the objectives of the study. The accessible comprised the target population who at the time of data collection were available and willing to participate in the study.

3.7 Sampling Techniques

A purposive non-probability sampling technique was employed. Purposive non-probability sampling is congruent with the descriptive research design (Creswell & Creswell, 2017), allowing the researcher to perform a sound study on a small sample selected purposively to provide an information rich qualitative context to answer the research questions and meet study objectives. The libraries were purposively selected from the target population for inclusion into the sample. With this method, sample selection criteria were based on maximum participant variation in the extent of adoption of the new or renovated library buildings that incorporates the green library concept, size and the ability to represent fairly the libraries in Kenya. The selected libraries were deemed to have met the inclusion criteria as they had recently undergone renovation or relocation to new library building that incorporates the green library concept.

The researcher viewed this variation as a strength of the research strategy since patterns that would arise in the data between different institutions would be of great value in

drawing conclusion to the entire population. The head librarians of each institution were targeted. The data collected was qualitative in nature and its validity and the understanding that was gained from the data had more to do with the researchers analytical and interpretation skills, than the sample size as is common of the adopted descriptive research design, in a qualitative approach study.

Moreover, Etikan et al. (2016) stated that purposive sampling enables the researcher to decide what needs to be known and sets out to find participants that will provide the information by virtue of knowledge or experience, in this case libraries with the Knowledge and experience of the green library concept. According to Etikan et al. (2016) purposive sampling is employed in qualitative research to identify and select the information-rich cases for the most proper utilization of available resources. This involves identification and selection of participants or groups of participants that are proficient and well-informed with a problem of study. In each identified library, the chief librarians who are professional trained librarians working in the library and offering library services were targeted.

3.7 Data Collection Methods

In view of the comprehensive nature of the study, and in conformity with qualitative explanatory studies, data triangulation was applied. Data was hence collected using face-to-face interviews, observation and document review. These three methods complimented each other. Data triangulation allowed the researcher to collect a variety and rich data about the phenomena enriching the findings. For example, data from the document review complemented the interview and observation data to the researcher to confirm the existence of green practices and the conformity of the library buildings to known green building standards.

3.7.1 Interviews

The collection of primary data was done using semi-structured interviews with Head Librarians of the selected organizations. A semi-structured interview schedule was used to ensure that the same basic lines of enquiry are pursued with each person that was to be interviewed. A list of questions to be covered was derived from the research questions. The questions were structured thematically so as to sufficiently provide insight into the themes of the study and also to provide an opportunity for thematic analysis during discussion of findings. The interview questions were also designed in a way that allowed the researcher to build a conversation within a particular area, to word questions spontaneously and to establish conversational style but with the focus on a particular subject that will have been predetermined. Data was collected by a combination of note taking and tape recording. Each interview took an average of 30 to 45 minutes. Permission to tape record was sought in advance from the participants. Where there was need, the respondents were requested to verify some answers to the questions through follow ups that were conducted via emails. In one instance a respondent was not sure whether their library had solar panels on the roof top as alternative source of energy and they requested to verify with their facilities manager and then follow up with the correct information. Indeed, the respondent followed up with an email after one week with correct information which was further updated on the study results.

3.7.2 Observation

Direct observation was used for this research to complement the interview method. The type of observation was nonparticipant, where the researcher conducted the observations from ‘outside’ and took notes. In qualitative research, this method is ideal. This is because the direct observer endeavors to be as modest as possible to avoid a bias on the observations employed, to observe the participants in sequences and procedures and to

essentially see the physical aspects requiring study such as a building detail (Kawulich, 2012). Observation method provided firsthand information regarding the nature of the libraries and whether they indeed practice green concepts and sustainability.

The researcher took pictures around some libraries after being allowed permission to do so. Some libraries restricted taking of photos while students are studying as this was against their institutional policy. The observation of the libraries helped the researcher to observe how the library buildings had been designed to fit the concepts of going green. The researcher used a checklist in appendix B, to examine if the library building had been designed with the concept of green buildings. This enabled the researcher to verify and complement the information obtained from the interview session.

The process of observation aided in the collection of objective information by observing issues such as the structure of the buildings, the procedures and services that encompass sustainability, facilities and infrastructure and environment conservation among others. The observation method helped to overcome the limitations of the interview method of data collection by verifying and confirming stated facts.

3.7.3 Document Review

Document review is a methodical procedure for analyzing documents, both printed and electronic material. Like other analytical methods in qualitative research, document review needs that data be examined and interpreted to elicit meaning, gain understanding, and develop empirical knowledge (Bowen, 2009). Document review was carried out by skimming (superficial examination), reading (thorough examination), and interpretation of the document content (Bowen, 2009). The study reviewed policy documents and library building blueprints. Appendix C provides the document review checklist that

guided the researcher in the process. Additional materials published in the libraries' websites related to green library initiates strategies and policies were accessed for review.

3.8 Psychometric Properties of Data Collection Instruments

Psychometric properties of data collection instruments are used to ensure credibility of the research. While quantitative studies ensure research credibility by ensuring the validity and reliability of the research instruments, qualitative studies ensure the instruments truth value, and consistency. According to Asunta, et al. (2019) research instruments need extensive evaluation before they can be considered to have excellent psychometric properties. Accordingly, in order to ensure the credibility of this study, the study ensured the truth value, and consistency of the research instrument. In addition, a pilot study was done to evaluate the procedures for respondents selection, usability of the instruments, and data collection processes (Fraser et al., 2018).

3.8.1 Truth Value

Truth value denotes that the research data is rich and reflects the respondents' knowledge (Mayburg & Poggempoel, 2007). In ensuring truth value the researcher takes necessary measures to get to an in-depth knowledge of the respondents' world view and the meaning they ascribe to the elements of their world (Hung & Hoi, 2010). The measures taken to ensure truth value in this study were maintaining a reflexive journal of the field work that made sure the researcher did not influence the research process and the respondents' contextualized knowledge was captured appropriately (Hung & Hoi, 2010; Mayburg & Poggempoel, 2007). The researcher also had a prolonged engagement with the participants. Further, truth value was ensured by using different methods of data collection including, interview guides, observation checklist and document review. The human responses, policy documents and blueprints, as well as observation offered varied

data sources that enhanced the truth value of the study. In addition, peers throughout the process monitored the researcher study decisions. Lastly, the researcher provided the respondents with the data analysis report to do a member-checking to ensure that findings were actually reflecting the respondents' thoughts and opinions collected during the study.

3.8.2 Consistency

Consistency refers to the 'trustworthiness' through which the research methods have been undertaken and is reliant on the researcher keeping a 'decision-trail' ensuring that their decisions remain clear and transparent (Noble & Smith, 2015). This study used, peer debriefing to ensure trustworthiness of the research (Hadi, & José Closs, 2016). Peer debriefing is an analytic triangulation, whereby a researcher calls upon a peer who is not involved in the research project, to aid in probing the researcher's thinking around all or parts of the research process (Given, 2008). The researcher here chose a peer debriefer, a university librarian, who could effectively interrogate the research both substantively and methodologically.

3.8.3 Pilot Study and Pre-testing of the Instruments

According to Pratt (2008), pilot study is administering instruments to a small group of people that have comparable characteristics to the target population, and in a manner that simulates how data will be collected when the instruments are administered to the target population eventually. In this study, the researcher conducted a pilot study to assess the proposed data analysis techniques and unearth possible problems to assess whether the research was realistic and practical; to collect preliminary data used to evaluate techniques using small sample size and provide proof of concept. According to Winchester et al. (2017) preliminary data refers to data obtained from small-scale study to

examine the feasibility before carrying out full study. The study collected preliminary data on the research questions. Further the pilot study was used to find the logistical problems which might occur as a result of applying the proposed research methods; to determine the financial and human resources required for the planned study and finally to be able to develop and test the adequacy, capability and reliability of research instruments; and to assess the feasibility of a comprehensive study. The pilot study was carried out among Librarians in KCA University and Aga Khan University.

A pilot study was necessary to enhance the validity of the research instruments that is interview guide. It helped to determine if the instruments would produce the data desired, detect problems which the participants of the research were likely to encounter while responding to the questions and also to establish if the questions were clear or ambiguous. The respondents of the pilot test were requested to give comments on each element of the instrument regarding the suitability of the content and clarity of the language used. Thereafter, the researcher analyzed the responses and comments given by the respondents. From the feedback, the instruments' scope, comprehensiveness and content were improved further as to enhance the reliability.

For this study, pre-testing comprised face-to-face interviews with librarians from two libraries perceived to be going green but not part of the sample of the study. The participants of the pilot study were not included in the final study. The procedures that were used in the pilot study were similar to those that were used during the actual study. The following procedures were undertaken in the pilot study with a view of improving the validity of the interview schedule:

- Conduct interviews to pilot respondents in the exact same way as it was be administered in the actual study.

- Assess whether interview questions provided enough responses.
- Request from the respondents any feedback that they found ambiguities and problematic questions which could be discarded.
- Confirm that all interview questions were understood and answered.
- Established those responses could be interpreted in terms of the information that was required.
- Rephrasing questions that were not answered as expected.

The results of the pilot test informed the researcher on the appropriateness of the analytical techniques that had been identified for use as well as refined the methodology for the subsequent phases of the actual information-gathering. Table 3.2 illustrates the pilot study results.

Table 3. 2: Pilot Study Results

Findings	**Conclusion**
The concept of greening library is not new among Kenyan librarians	Kenyan librarians had an idea of green movement and were in position to illustrate the concept of green library.
There were some extend of green library practices among Kenyan libraries	Libraries in Kenya had implemented green library initiatives or demonstrated intentions to adopt the initiatives.
Librarians could point to some factors affecting green library implementation.	There were potential factors driving or limiting the adoption of green library initiatives in Kenyan libraries
There were strategies taken to transform libraries to green library	Strategic actions have been taken to transform libraries to green libraries.

3.8.4 Quality of Research

This study used triangulation technique to enhance the accuracy of the observation from the interview discussion and enable validation of the data collected as discussed by Ashour (2018). This was achieved by collecting data from different participants. Using respondent triangulation, different respondents' groups (including public University libraries, private chartered University libraries, Public libraries, School and Special libraries) opinions were compared to ensure that the information provided by respondents was credible. The researcher notes the possibility of differences in setting, functions and practices of the libraries selected. This allowed broad and in-depth description of the behavior and experience of the respondents with green library initiatives and environmental sustainability (Korstjens & Moser, 2018).

To ensure dependability of the research, the researcher used an audit trail that entailed a clear description of the whole research process from the start to the development and reporting of the results. The records are well maintained.

To ensure conformability the researcher employed triangulation of data from one participant group to another. According to Heale and Forbes (2013), triangulation increases confidence in the results by the confirmation of a proposition using two or more independent measures. The combination of the findings from the different group of participants in this study provides a comprehensive picture of the findings than either one group of participants could have done. The analysis of the research methodology helps in establishing conformability (Elo et al., 2014). Confirmability is concerned with determining that data and interpretations of the results are not fabrications of the researcher's imagination, but clearly derived from the data (Korstjens & Moser, 2018).

3.9 Data Analysis

Data analysis involves studying respondents' information and organizing and preparing the data and representing the findings in tables, graphs, and figures (Creswell & Creswell, 2017). Qualitative data analysis seeks to make general statements on how categories or themes of data are related. Data is in the form of text, materials, and photographs, which describes events and occurrences. The logical arrangement of the details of the research being conducted, the examination of bits of data for their relevance towards the research, analyzing the data for underlying themes and patterns, categorization of data and lastly the synthesis of results and generalizations arising thereafter form the steps of data analysis as suggested by Leedy and Ormrod (2010). The authors maintain that the researcher ought to look for triangulation of the data whereby separate pieces of information must all point to the same conclusion.

In this study, framework analysis was the mode of analysis that was applied because it is in line with the interpretivism paradigm that forms the pillar of this research. Therefore, data analysis took place during and after the field work. The data collected was organized and categorized and the relationship between the categories established. Themes and categories were generated using the classifications provided in the interview schedule.

3.9.1 Framework Analysis

The grounded theory approach was used to analyze the qualitative data. The approach attempts to draw meaning of the respondents' interactions, perspectives and social interaction with the phenomenon (Creswell & Creswell, 2017). The gathered data was sifted, charted and sorted based on the key issues and themes in the study. Indexing was used whereby the researcher identified the portions of data that corresponded to study themes. This was applied to all the textual data that was recorded in the interview transcripts. A numerical system was used for the indexing references and annotated in the

margin beside the text. NVivo, a qualitative data analysis tool was used to aid the analysis of the data.

3.9.2 Data Presentation

The data was summarized into a compact, concise and logical order and presented qualitatively and descriptively in the reporting of the findings. Presentation of results was through written descriptions, narrative quotations and photos from observation.

3.10 Procedures and Ethical Issues

A research permit was applied and approved by National Commission for Science, Technology and Innovation (NACOSTI) before proceeding with the data collection. Ethics approval was also provided by the USIU-Africa Board of Research Ethics. All participants were made aware of research intentions and design by an introduction letter followed by an email. The researcher abided by a system of ethical protections to protect the right of respondents. The principle of voluntary participation was applied. Closely related to the notion of voluntary participation was the requirement of informed consent. Essentially, this meant that prospective research participants were fully informed about the procedures and risks involved in the research and they were only interviewed after they provided their consent to participate.

Confidentiality was guaranteed in this study by ensuring that all information that threatens participants' confidentiality and autonomy will eliminated from the final data collected. The participants were referred through Pseudonym. Data collected was used for the purpose of this research only. No source, whether individual or organization was correlated with specific findings or comments attributed to the originator or institution. All discussions remained confidential in relation to other institutional participants and during the reporting of findings. In reporting the findings, bias language or words against

persons because of gender, sexual orientation, racial or ethnic group, disability or age was avoided.

3.11 Chapter Summary

This chapter focused on research methods and the methodology used in the study. The study adopted a subjectivism ontology and interpretivism epistemology and utilized a multiple case study research strategy to examine and explore the research problem. Data was collected through, face-to-face interviews, observation and document review. Purposive sampling was used since it was the most appropriate for the study to ensure that only libraries who have embraced the green concept participated in the study. Grounded theory approach was used to analyze data during the collection process. In the analysis the gathered data was sifted, charted and sorted in accordance with key issues and themes in the study. Indexing was used whereby the researcher identified the portions of data that correspond to study themes.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents, analyses and interprets data in line with the research objectives. Data analysis was done using NVivo which is a qualitative data analysis software that helps to organize, analyze and find insights in unstructured or qualitative data such as interviews. Data analysis began by looking into the data to find out where patterns form within the data from the interview transcripts. The comprehensive analysed data is presented following major themes, scaling down to subthemes and sub-sub themes where the in-depth level was guided by the richness of the data brought out in the findings. Findings are explained from the comprehensive report, and data samples from the comprehensive raw report are used to explicate the findings further. The themes were derived from the research objectives as follows:

i. Comprehension and perception of Kenyan librarians towards the concept of greening libraries for environmental sustainability.
ii. Greening methods/practices adopted by Kenyan libraries.
iii. Factors driving and impeding libraries' embracement and implementation of the green concept.
iv. Strategies to guide libraries in transforming into 'green libraries'.

4.2 Respondents Distribution

This study's respondents were drawn from five public university libraries, three private chartered university libraries, two public libraries, one school library and one special library. Table 4.1 highlights the respondent's distribution from the participating libraries.

Table 4.1: Respondents Distribution by Category

Library	Target Sample	Actual Respondent	Category
University of Nairobi Graduate Research library	1	1	
Kenyatta University postmodern library	1	1	**Public University**
Moi University Margaret Thatcher library	1	1	**Libraries**
Masinde Muliro University	1	1	
Embu University	1	1	
The Catholic University of Eastern Africa	1	1	**Private Chartered**
United States International University – Africa	1	1	**University Libraries**
Adventist University Library	1	1	
Kenya National Library Service- Upper Hill	1	1	**Public Libraries**
Kenya National Library Service- Nakuru	1	1	
Mpesa Foundation Academy library	1	1	**School and Special**
International School of Kenya library	1	1	**Libraries**
Total	**12**	**12**	

This study interviewed 12 library heads, one from each of the libraries. This resulted in five (5) head librarians drawn from public university libraries, three (3) head librarians from private charted university libraries, two (2) head librarians from public libraries and two (2) head librarians from school and special libraries.

4.2.1 Characteristics of Respondents

In terms of job position, seven (7) of the respondents were university librarians, two (2) principal librarians and two (2) school librarians. Regarding years of service, most respondents (8) had over ten years of service in their position, and four (4) had less than five years in their work. In terms of age bracket, three were between the age of 40 – 50 years, four (4) were between 30-40 years, and five were above 50 years of age. Six (6) respondents had a PhD, while five (5) had a master's degree and one (1) had a bachelor's degree. All the respondents were Kenyan. Lastly, six (6) of the respondents were male, and six were female.

4.3 Librarians' Perception of the Concept of Green Libraries

Libraries, both public and university-based should be environmentally sustainable. A key approach to this goal is the implementation of the green library concept. Objective one of this study aimed to establish the comprehension and perception of Kenyan librarians towards the concept of greening libraries for environmental sustainability. Section B of the interview schedule focused on gathering respondent perceptions and views regarding the concept.

On one hand, Kenyan libraries' role in green concept was perceived through their structural design to allow natural lighting, green roof, saving energy and water conservation. On the other hand, participants viewed the concept based on how libraries and librarians contribute to eco-friendliness of the environment and waste management. Participants' statements highlighted in the following sections sum up their comprehension of green libraries.

4.3.1 Implementation of Green Concept in the Library

This study inquired whether librarians perceived their library to be green. Most respondents considered their library green to some extent, as illustrated by some of the green library practices in their libraries. One of the respondents, while explaining the green concept of their library, stated,

> *I can say that our library is green because the library building is made with enough lighting to minimize electricity use. We also encourage our users and even the staff during the day to put off lights and only switch on when it is dark.*

In another instance, one of the respondents said, “Our library is green as we make use of the available resources, for example, the saving of energy by using the sun, harvesting rainwater, and taking care of ventilation because we don't have air conditioning in this building.” The sentiments of the respondent reflect the observation made on some of the physical library buildings under observation in the study. The buildings were fitted with adequate windows to let the sun light the building. The roofs were also provided with translucent roof iron sheets that allowed natural light into the library. This helps the libraries avoid relying on electricity and rely on natural sunlight. Figure 4.1 shows the images captured of some of the library buildings. Figure 4.1 show library buildings with adequate windows to let in natural light.

Figure 4. 1: Use of Natural Lighting in Libraries

A look at the reading space inside the library shows a well light space with natural light coming in from the windows and translucent roof sheets, as evidence in Figure 4.3.

Figure 4. 2: Reading Space with Adequate Natural Lighting

Regarding adopting greening aspects in libraries, different interviewees expressed what areas the greening is evident. These aspects include environmental elements that have to do with energy, harvesting of water, limited usage of resources, and the use of digital libraries.

a) Environmental aspects: The concern over the environment was mainly linked to natural lighting, tree planting (Fig 4.3) and the proper use of available resources. These environmental factors were considered an integral part of the library model, and there have been many strategies to incorporate greening in all the activities of the libraries. One participant stated, “When our library was being commissioned, the managed planned to make the inside and surrounding spaces green and more environmentally friendly. We have since planted some trees and flowers in the spaces surrounding the library building.”

Figure 4. 3: Tree Planted Inside the Library

b) Considerations for natural light: Participants emphasizes on the importance of buildings with big windows for natural lighting to minimize electricity use. In addition, they encouraged users and staff to put off lights during the day. One respondent pointed out that, "The architectural makeup of the buildings is done to allow for natural light including using more windows and constructing atriums or transparent roofs." Another respondent stated that,

> *"I think we have used natural light most of the time by having glass walls and part of the roof roofed using a transparent material. We have more natural light coming in."*

c) Planting trees: - The other aspect reported was planting trees and grass outside the library buildings as an aspect of greening (Fig 4.4).

Figure 4. 4: Planting Trees

d) Harvesting water: - harvesting water, taking care of running taps and other aspects. One respondent reported that they try to put notices urging users to turn off the taps after using water. They also have fixtures that automatically produce water using sensors for cleaning and drinking (Fig 4.5).

Figure 4. 5: Automatic Taps that produce Water

Some libraries reported harvesting water using the roofs gutters. The water was used to irrigate the green gardens around the libraries. One of the respondents confirmed this argument and stated, “We have water harvesting whereby we have huge water tanks surrounding the library to tap rainwater and irrigate plants. We have put gutters that collect water into our underground tanks.”

e) Limited usage of resources: In limiting the use of resources, some libraries reported that they fail in this component since they lack policies that can guide the library in resource usage. People tend to waste resources when there are no policies on using natural resources like water and acquired resources like electricity and papers. However, libraries are trying to minimise the usage of power. Various strategies are used, for example-controlled switches where the library official has total control of the lighting system of the library. Another

element of proper utilization of resources available in the library is minimizing paper usage. One of the respondents stated,

> *We do not print on paper; we always encourage working online. We just print when it is essential. We do not encourage printing of everything. Minimizing the usage of paper saves on the resources as libraries use less pap, meaning fewer trees are cut, creating environmental sustainability.*

f) Use of digital libraries: - libraries reported migrating to digital paperless tools. In other instances, the old books are being converted to digital formats. This allows for no further dependence on the hardcopy books, which ensures that libraries no longer need to reprint hardcopy, even for the old books. Some libraries reported that they are now making more electronic resources than hard copy books. Libraries are also subscribing to e-journals to offer their readers a variety of online resources instead of relying on hardcover books.

Further probing sought to determine the extent of the greening of the libraries. Some of the participants considered their library to be partly green. One respondent indicated that,

> *I think our library is partially green because of how it was built. Certain things in its structure make it partly green, such as the garden in the middle, the way the roof is built, and the way the building was designed, making me feel that it's a partially green library. And then also the way the windows let in natural light.*

Another respondent stated, “I consider our library partially green because we are currently going into the virtual library. We are working towards, providing accessibility through online resources, virtual library, eBooks and stuff.” Other participants considered their library to be predominantly green. One of them stated, “I would consider the University Library largely green, but not completely green. This is because measures have been taken towards environmental sustainability, including policies and procedures, ensuring the sustainability goal is achieved.” However, there was an almost unanimous agreement among all the interviewees that none of the libraries in Kenya can be considered 100% green as there are always areas for improvement,

"I would not, of course consider our library to be fully green. For our library, I would call it partially green because, from the environmental part, we have managed its appearance. For example, we have a lot of green plants all over, and that really makes our lives very green".

4.3.2 Green Services in the Libraries

The respondents acknowledged having some green library services to promote environmental sustainability. Services linked to greening infer some specific considerations to ensure that greening occurs. Some libraries had established an energy management committee that provided information on environmental sustainability:

> *We have an energy management committee comprising of librarians. One of the things that we do through this committee is to offer information on environmental sustainability. Secondly, the librarians also provide environmental literacy services. Once in a while, some of our librarians are called upon to participate in workshops related to environmental literacy.*

The energy management committee takes care of the events in the library and always seeks to ensure that only the best practices regarding the greening of libraries take place. Another element related to services offered by green libraries was designated library staff who train users on best practices in environmental sustainability. One respondent said, "We have a librarian in charge of training users on best practices in environmental sustainability. This librarian prepares programs for users on how to use the library sustainably and access and use the services sustainably." E-library services were considered among green library services as indicated by one of the respondents. "The other service that enables greening is migrating library services to online platforms. This enables librarians to serve their users online, reducing the use of many other resources like energy, water and paper."

Libraries also conduct targeted training, identifying special target groups to share the message of greening initiatives and environmental sustainability. It was stated, "We have

an outreach program that engages the community. In this program, we teach society about improving their reading culture and integrate tree planting aspects around the library." However, some respondents reportedly did not have any initiative to offer services linked to greening. One reported indicated, "Our greening library initiative comes in a tiny aspect where we plant trees, but when it comes to a service, I think that we have not initiated any green services in the library."

4.3.3 Library Contribution to Eco-Friendly/Environmental Sustainability

The contribution of libraries to eco-friendly/environment sustainability was considered along three components encompassing, re-using and recycling of materials, reducing waste and toxic products, and developing alternative technologies.

4.3.3.1 Re-Using and Recycling of Materials

Respondents were probed about strategies they adopted to reuse and recycle various materials. Some libraries reported re-using some materials while others had not reached that level of reusing and recycling materials. Responses obtained revealed that libraries have had to go outside their average mandate and try to engage with people outside the realms of their parent organisations through conservation. In one isolated case, a library hosted a collection point for recyclers on their premises. The respondent stated, "We have been encouraging people to put the plastic bottles in one place, where slum dwellers collect them and reuse them to make chairs and lamp shades and things like that."

Libraries also gave out used cartridges to recyclers instead of disposing of them in the environment where they could be harmful to the environment. A respondent stated, "First of all, what we do with spent cartridges is, once we remove them from the machines, we normally give them to someone else who is recycling them instead of throwing them away. We give them out for recycling."

4.4 Greening Practices Adopted by Libraries

This objective was tested under the library's greening methods and environmental sustainability practices**.**

4.4.1 Understanding Environmental Sustainability

The results indicated a sufficient understanding of environmental sustainability with greening methods and techniques as part of environmental sustainability. All Participants who represented different libraries showed adequate knowledge of ecological sustainability and its diverse facets. Most of the participants understood ecological sustainability as preserving the results confirmed that the libraries are fully involved and concerned with environmental sustainability. It showed that most libraries put different practices in ensuring the greening of libraries as a form of ecological sustainability. The techniques discussed below were noted to be used by most libraries for environmental sustainability and were recognized as the most effective tools for environmental sustainability.

4.4.1.1 Architectural Designs

4.4.1.1.1 Atriums

The results indicated that most libraries for their roofing used atrium architectural design and green roofs. An atrium is an elongated roofing design that is very transparent and made of fine sheets or glass ceilings. The atrium architectural design is essential in ensuring that enough natural lighting penetrates the building, therefore helping to save the use of artificial light such as electricity during the day. The atrium was used by some libraries, while a few others did not have it. One participant stated, "Our library has an atrium. It can be seen immediately after entering the library since it is elongated and transparent. The atrium has been very helpful since the library can access natural lighting all day."

The study further established that a few libraries had to redesign and replace their old asbestos roofing with an atrium. One of the respondents from libraries with redesigned roofing noted, "We had these roofing called asbestos which is not environmentally friendly. Later the library changed them and replaced them with the atrium design, which allows in natural light". Another stated, "Our library currently has a Canopy, which usually looks very beautiful and allows natural light. Before, we used to have the translucent ones, and these were replaced."

4.4.1.1.2 Green Roofing

Although not commonly used, the results revealed that some libraries adopted green roofs for environmental sustainability. A green roof is where plants are planted on the top of the building to help maintain the room temperatures by keeping the rooms cool as explained by one of the respondents.

> *Oh no, we do not have a green roof on where the plants are planted on the rooftop. However, I have seen this kind of roof in another library. I think it would be a great idea if we also adopted this since we have sufficient space at the top.*

These results suggested the possibility that some participants did not understand the concept of green roofs and its purpose. There could have been green roofs in some respondents' libraries, but they may have not been sure whether it was used for beauty or environmental sustainability. A statement by another respondent confirmed this view. "Honestly speaking, I am not familiar with the concept of a green roof. I have heard of it but I cannot speak authoritatively. However, it sounds like a great initiative for libraries to adopt while ensuring environmental sustainability."

4.4.1.2 Maintenance-Friendly Construction

The results suggested that a sustainable library may not require many resources to maintain. Many libraries were reported to be maintenance friendly. This was

characterized by ease of construction in which the walls were big chunks of windows, which allowed natural light into the library (Table 4.2: participants 1 and 2).

Table 4.2: Participants Responses to a Sustainable Library

Participants	Response
Participant 1	Yes, our library is maintenance friendly. It is made up of stone with very many aluminum windows. Partitioning was done on the first and second floors and used bolts instead of stone. We are planning to expand in the future, and due to the nature of the building and how it was built, we will not interfere with the floor when removing the partitioning.
Participant 2	Since the library building was commissioned, we have done very little on maintenance except on a few adjustments that had to be done; for example, when the rain used to pass through the window, it was addressed with time.
Participant 1 from the libraries	The materials used in the building are no longer timber apart from the shelves. The materials used in our library include aluminium and glass, which can be easily changed during maintenance
Participant 2 from the libraries	No, we don't do maintenance. After a long time, the only thing we have done is the carpet replacement. The carpet was incorporated since it reduces the noise as people walk in or around the library. Therefore, this was the only significant kind of maintenance I could say we have done so far.

On the other hand, a section of libraries rarely did maintenance. However, replacement in the library is done when need arises (Table1: Participant 2 from the libraries).

4.4.1.3 Redesigning

The results revealed that most libraries had redesigned or planned to redesign using intelligent arrangements to utilize space maximally (Table 4.3).

Table 4.3: Participant Responses on Redesigning

Participant	Response
Participant 1	Yes, we have redesigned severally to create and utilize space in our library. For example, the space the tanks have occupied used to be the medical book space. However, we removed them to create space for the tanks
Participant 2	We have redesigned severally. Recently, we rearranged the library into different sections according to users. This was in different sections such as the kids, pre-teen, teen, and adult sections
Participant 3	Before, we used to have offices in sections. However, since we redesigned, we now have open area offices, which has helped utilize a lot of previously wasted space

4.4.1.4 Zoning of Lights According to Requirements

The results indicated that zoning of lights was considered among some of the most common practices for environmental sustainability. The results indicated that many libraries incorporated zoning of lights following the requirements. This meant that in cases where there was enough natural light, fixing bulbs was minimal, while libraries used artificial lighting, then bulbs would be fixed regularly. On the other hand, a few libraries reported not practicing zoning of lights like the others. One of the participants stated,

> *Yes, we do zoning. Most of the time, we use natural lighting following the big windows that have been fixed in our library. The different bright colours are painted on the walls, enhancing the natural lighting… We have put the energy-saving bulbs and removed the old ones. In sections with natural lighting, we have set more miniature bulbs or none in a standardized manner.*

Acknowledging lack of zoning of light, one respondent indicated, "I would not say we have practiced zoning of lights since we have bulbs in all sections regardless of natural lighting. What has been done is that most bulbs are permanently switched off."

4.4.1.5 Bicycle Parking Spaces

The findings showed that many libraries did not have designated parking spaces for bicycles compared to other types of transport such as cars. Some libraries reported to having car parking spaces co-shared with the bicycles but not have parking spaces for bikes. This means that the most common mode of transport is still vehicular automobiles which use petrol and have a significant carbon footprint. Some libraries confirmed that they have parking spaces for bicycles.

> *Out there, the bicycles are trendy, but apparently, we do not have parking spaces designed for them… "No, we do not have parking space designated for bicycles. We had identified a place to set it, but the government procurement procedures and processes are very long and have not approved payments for the rails used to lock the bicycles.*

While others were in the process of arranging for dedicated bicycle parking space. "Yes, we have designated a place to be bicycles parking space. However, we have not installed the rails, and thus the cyclists ought to be creative and find the best way of parking their bikes."

4.4.2 Environmental Impact on Immediate Surroundings

This study's findings suggested that participants' perception regarding the impact of go green library on the surrounding revealed mixed responses, registering negative, positive and even uncertainty of the effects. The respondents perceived clean air as a positive impact of greening activities around the library, "There is no pollution in the library

surrounding; there is clean air.*”* Most of the libraries also considered a serene environment as one of the factors that influenced them to embrace the green concept. One of the respondents stated, "You know when the environment is green, natural, and good; it makes reading very interesting. Everyone wants to read in a space that is natural and green. This in some way attracts people to the library."

However, the participants pointed several negative effects including Noise and dust, “When construction is ongoing, there is a lot of noise and dust.” Other respondents cited excessive wild trees, accidents from falling trees and frigid temperatures. “I remember one time there was a storm, and one of our walls was completely brought down. This maybe leads to the question of what type of trees should be planted around the library.” Greening activities such as planting of trees, flowers and even fruits extended beyond the immediate library surrounding to its neighborhood. One respondent explained, “We have planted trees in a school that is a kilometer away… We have been cleaning the roads around us and collecting garbage, and therefore our neighbors enjoy walking on clean roads.”

4.5 Factors Driving and Impeding Libraries Embracement and Implementation of the Green Concept

Objective three of the study sought to understand the factors that influenced libraries drive to embrace and implement the green concept. Many libraries participated in the greening activities. While all libraries recognized the importance of participating in the initiatives, most of them had not implemented them. One respondent stated, ″From our side, we have not organized or participated in such initiatives. However, it is such a great idea.″ The reluctance could be attributed to many challenges that constrained adoption of greening initiatives in libraries.

Respondents reported a positive environment created by the institutions to promote greening concept. Some respondents indicated that libraries collaborated with external organizations such as their parent university where the library is located and green movement NGOs to promote the green library. One of the respondents stated, "Yes, we have participated. The most recent is the tree planting project which the university did." This information suggests that participation provided learning opportunities and experience on greening initiatives, which could be transferred to the library processes to promoted greening.

4.5.1 Policy Implications

The results showed that many libraries had embraced the green concept to be at par with the world order. Libraries had made many redesigns and upgrades to ensure they are not behind the current world standards of libraries.

> *The world is fast-paced, and thus we must keep changing and improving. Like in the past, there was no green, and since the greening concept came up, we have to embrace and do what we need to do to ensure our library is in the same standards as others across the world.*

Notably, most libraries acknowledged Vision 2030 as a policy factor that drives their libraries to embrace the green concept. A respondent stated, "Greening concept is part of the SDG's, African Agenda 2063, and Kenyan vision 2030… the library building completed was part of the flagship 2030 initiative, and therefore, its policies guide us in the green concept."

4.5.2 Environmentally Friendly

On the surface level, findings show that most libraries embrace the green concept since they want to feel and be seen as environment friendly. However, upon further probing, libraries were found to have embraced the green idea as part of the environment conservation metric such as conservation of water and energy among others. This was

evidence from the sentiments of one respondent that indicated, "We fully participate in the green concept to conserve the environment by saving energy, water, and many others. By doing so, we will be the driving force on the greening concept." Libraries were open to the green concept idea arguing that it contributed to sustained life as indicated by one of the respondents. "Environment is life and sustaining life will be hard if we cannot conserve it. Therefore, even personally, I believe people should embrace the green concept to help conserve the environment and eventually sustain life."

The results further revealed that most libraries had embraced the green concept due to the need to solve pre-existing conditions such as global warming. Thus, participating in initiatives that look into solving or reducing the effects of global warming was seen as a solution to human eradication. In this regard, one of the participants stated,

> *The second most threatening factor is global warming, and we have felt its effects in one way or another. As knowledge managers, we can't have a back seat when all this happens. Thus, in our little ways, we are doing what we are capable of to ensure that we help in a way.*

The results showed that libraries have policies prohibiting users from chewing gum in the library because gum is not biodegradable and is detrimental to the environment when not properly disposed. This finding was universal across the libraries. A respondent noted that gum is considered litter,

> *One of the library's policies is that no one is allowed to chew. Nobody is allowed to chew within the library premises. Also, the attendants cannot serve anyone who is chewing. Moreover, our guards are very intentional about this such that if they find you chewing, you are thrown out of the library until you dispose of the chewing gum.*

4.5.3 Challenges Encountered in Implementing the Green Concept

This study's results revealed various challenges that libraries encountered in attempts to implement greening initiatives.

4.5.3.1 Inadequate Facilitation, Lengthy Processes

The participants, particularly from libraries hosted within universities, complained about difficulties in approval of budget to support most practices that embrace green concepts for environmental sustainability and in some cases, lack of such budget all together. One of the respondents noted," You find that initiatives and practices our library gets involved in are always budgeted for. For these practices to be facilitated by the organization hosting our library takes too long." Another respondent echoed similar sentiments and stated,

> *Of course, funds are the major issue when implementing these practices. Every time we try, we are usually told to try some other time since it was not budgeted. We have been doing a lot of proposals, but none has gone through. A good example is the ABS solar grant which did not go through.*

4.5.3.2 Lack of Clear Understanding of the Green Library Concept

The findings of this study portrayed participants' inadequate understanding of the green concept. Some participants indicated they had little knowledge about the concept or initiatives while others indicated they did not understand the concept of green library initiatives. One respondent stated," It looks like most librarians, and users, in general, do not understand what the green concept is and thus implementing environmental sustainability through green libraries becomes hard for them." This view was clear across many respondents suggesting the lack of and need to expand knowledge about green library in universities.

4.5.3.3 Organizational Culture and the Lack of Interest from the Library Users

The results showed that most issues regarding green library practices were systematic and cropped from the organizational culture. Moreover, the participants noted that even the users' attitudes toward the green concept directly affects the library's involvement in greening practices and participation. One of the respondents said,

> *"Yes, the interest of users is a big challenge. When the library gets involved in such activities, they want even its users to be part of it. However, most users show a negative attitude and lack of interest."*

4.5.4 Solution to Greening Challenges

Despite the challenges, respondents proposed various solutions to improve the understanding of the green library concept and foster participation in green initiatives. Generally, respondents tended to agree that increasing information literacy, training and the management involvement in creating an eco-friendly environment was important to promote green library.

4.5.4.1 Increasing Information Literacy

The findings suggested mass sensitization and increasing information literacy of the librarians, the users and the management on greening. One of the participants said," I feel it is essential for people to be literate on green library matters to tell how the green libraries work. People should know what it means to plant trees and, most importantly, why we should focus on environmental sustainability." Another respondent corresponded by stating, "I think we need more to enlighten the staff and users to understand the green concept and possibly get engaged on the initiatives. I feel this can be done even though training and sensitization programs." These responses suggests that the green library concept can be acculturated in people's minds if they are sensitized about the concept.

One respondent emphasized on this strategy by citing Singapore's adherence to the greening concept. They said,

> *The main issue is sensitization. People need to be educated and convinced about the green concept...I have been to Singapore, and I love the place. If you are on a flight and have chewing gum, you could face deportation on the same flight...if you try even to throw a piece of tissue, a person will stop you and then ask you to pick up your waste. They love their country so much. This discipline has been rooted because of a lot of sensitizations… Even during our interactions with the library users, we often remind them that they should dispose of waste in the right place.*

4.5.4.2 Training and Other Library-Based Approaches

The study respondents underscored the need for initiating and adopting training initiatives to solve cropping issues on participation and adoption of the greening initiatives in the libraries. Some participants proposed installation of stilted windows, cutting electronic waste and focus on greening concepts. "I think we have to go green, especially in our offices. To reduce the heat, we need to have some of the windows tilted."

4.5.4.3 Creating an Eco-Friendly Culture

The librarians preferred that university management promote eco-friendliness by building designs and policies. One of the participants stated, "The management should develop ways to create an eco-friendly environment such as recycling. The amount of water used in the 3000-sitter library is a lot and can be recycled. It can be used either to water grass or trees."

4.6 Strategies that Guide Librarians in Transforming to Green Libraries

This study's findings suggested the need to develop strategies to guide in transforming to green libraries.

4.6.1 Strategies Used by Libraries

The findings show that although many of the libraries use strategies such as architectural innovations and renovations to transform libraries, there were other strategies adopted such as attending special greening events, setting targets for the tree planting days, and raising awareness while incorporating many stakeholders.

4.6.1.1 Architectural Innovations and Renovations

The study results indicated that architectural innovations and renovations were valuable strategies that guided libraries when transforming into green libraries. They helped make adjustments to the infrastructures in terms of renovations aimed at developing a sustainable infrastructure and utilization of space. A participant noted, "Renovations and

replacements are periodically done, when necessary, especially when there is a reported fault.” In agreement, another stated,

> *Since the library building was commissioned, we have not had serious renovations until recently. We renovated and redesigned the whole of the first floor to become classrooms due to challenges with space. Notably, the material used to redesign the room is so that it allows future expansion of the library or redesigning.*

4.6.1.1.1 Gardens- Green Spaces

Study results revealed some libraries’ participation in greening initiatives such as planting trees and creating garden spaces with plants and flowers. One respondent said," Yes, we are currently practicing greening in our libraries. For example, if you can see a space in the middle of the medical collection, there is a small garden." Some libraries used greening initiatives to promote certain themes and beliefs that were relevant to the community. For example, one respondent indicated creating meditation centers out of greening initiatives. "We have created a meditation Centre with chairs and a few plants… Having the plants around that area makes the environment cool for meditating."

4.6.1.1.2 Lighting

All the participating libraries considered natural lighting as a way of adhering to the greening concept. This included evaluating the sources of natural light in the libraries, which helps save energy and the expenditure on bills. To achieve this, some libraries reported using awareness methods to remind people about power conservation, where messages are pinned in all the sections to remind users and staff to switch off the lights when leaving the premises. Others confused power-saving LED bulbs.

Figure 4. 6: Strategically Placed Notice to Turn Off Lights.

Table 4.4: Participants Responses on Library Lighting

Participant	Responses
Participant 1	"Yes, we have considered natural lighting in most library sections since we have been looking for ways to cut electricity bills. So, most of the sections use natural lighting in the day and then at night, we use solar light."
Participant 2	"Yes, I think the windows were built as very big during the construction, which helps the natural light to come in. Therefore, we rarely switch on the lights during the day… we have sensors such that if anybody walks in, the lights automatically turn on, and once they move out of the room, the lights go off."
Participant 3	"We try to save light as much as possible. Therefore, we have posters reminding the users and staff to switch off the lights when they are not using them."

On the other hand, it was revealed that a small section of libraries was disadvantaged in terms of power-saving. Most staff reported that they did not fully observe power saving because they did not hold it in high regard. One of the respondents in these libraries said,

> *Like, I have four different long bulbs that are always on in my office. Since it is a small office, one bulb would be okay and provide enough lighting, The four bulbs have a common switch that I use, so it is impossible to have only one bulb on and the rest off.*

4.6.2 Measures Put in Place to Cut on Electronic Waste

Results showed that libraries intentionally reduced electronic waste through their greening practices. They used internet and communication technology to cut on electronic waste and promote greening. Participants, especially from the libraries understood about electronic waste and its barrier to greening. However, some participants had no idea whether their respective libraries had policies to cut electronic waste. One of the respondents said,

> *Yes, I try very much to cut on electronic waste. For example, my outdated personal computers are disposed of through the supplies department. There is a company that buys them and then goes to resell. We sold over 30 of them the other day. Additionally, we ensure that computers are switched off when not used… I have not had a chance to understand or know how my library disposes of electronic waste. However, we give most of the computers in our headquarters to our branches even in other countries.*

4.6.2.1 Using Communication Technology as a Greening Strategy

Participants agreed that that communication did not need to be done through written papers and instead could be done electronically to embrace and fully adopt the greening concept. One respondent noted," We rarely do manual signatures. We adopted electronic signatures apart from the county library branches where it is still manual."

4.6.2.2 Use of the Internet

Findings established that as the need to expand the communication within the library and across the departments and library branches grew, the libraries adopted the Internet to avoid paper wastage. The libraries considered using the Internet because it not only made

communication easier, but it was also one of the strategies to embrace the green concept. Moreover, the internet was highlighted as a handy tool that libraries used to research on new ideas to promote greening libraries. This were the sentiments of one librarian who stated, “I think the use of the Internet is one of the avenues we have completely adopted since everything is done online. The Internet has been a potent tool for cutting electronic waste and communication." This view was echoed by another librarian stating, "I feel that there are many P2P (peer to peer) where students study online in the library other than considering options such as printing and learning from home. You just open an account and download the content to read." This suggested reduced reliance of paper-based materials in favor of electronically based reading materials.

4.6.3 Library Attendance to Special Greening Events

The outcome showed that libraries mostly attended the greening events as part of the community engagement. The results showed that the events are organized by respective universities, external institutions or other are national events.

> *Yeah, we participate in planting trees in events such as the national annual tree planting day… we have participated in other annual events such as the IFLA green library competition, ... For example, the University has its environmental day arranged by the school of agriculture, and the world environmental day in which we all participate.*

Some green events were organized by the library:

> *Yes, we do participate. We have special greening events we conduct in Karura forest. We have a kids club where they always visit Karura and go out and learn about the environment… Yes, we plan events and have come up with plans where we get targets on tree planting since it is one of the important aspects of the environment.*

4.6.4 Networks and Partners in Environmental Sustainability and their Contributions

The findings reveal that libraries work with several partners such as governmental organizations like NEMA and Kenya Forest Department, NGOs and, their parent organizations in hosting environmental sustainability initiatives. Table 4.5 shows multiple responses suggesting library partnerships with external partners to promote the greening concept.

Table 4.5: Participant Responses on Libraries' Partnerships in Greening

Participant	Responses
Participant 1	"… we normally work with Kajiado county ... The county always gives us trees to plant on such special occasions. We do this to create memories of the epical guest who visit our institution. …, we have worked with Kenya wildlife services in the past."
Participant 2	"Yes … we have partnered with several community groups and the Kenya forest department These partnerships have been helpful since Kenya Forestry Service usually gives us these trees for free."
Participant 3	"Currently, we have NEMA which is fully on board, although we consider engaging more partners such as NGOs. We also get support from the Kenya forest Department, especially when we have tree-planting activities."

4.6.5 How Libraries Raise Awareness of Environmental Sustainability

Substantial evidence suggested that libraries wholly got involved and created awareness of the greening initiatives toward a sustainable environment. This includes appointing environment ambassadors to help promote environmental sustainability. Moreover, more libraries reported conducting education as a way of creating awareness. Conversely, many libraries said they had not had opportunities to develop an understanding of greening and environmental sustainability.

Table 4.6: Participants Responses to Awareness of Environmental Sustainability

Participant	Responses
Participant 1	"We have ensured that we appoint environmental ambassadors for every program. These environmental ambassadors participate in these activities and act as the face of our institution while creating awareness on greening initiatives."
Participant 2	"We normally have user education sessions where part of the user library sessions involves education and sensitization about environmental sustainability even through experts."
Participant 3	"With our library being a public community library, we organize interactive sessions which are more of information literacy sessions and make our users self-aware about the environmental sustainability and the role they have to play… we do create awareness in all ways possible. For example, we use posters in almost all sections of the library giving precautions concerning environmental sustainability. We also print posters when we have upcoming environmental events in which we would love the community and users to participate."
Participant 4	"Yes, we do. We even have a section where I have gathered a whole collection of materials that entail environmental sustainability. To me, this is a form of creating awareness."

One participant from libraries noted that they were not involved in creating awareness. “No, we have not done that before.” This could suggest that library employees could have been taking environmental sustainability as a personal initiative. For example, one respondent said,

> *Yes, I do, although at an individual level. So, I often remind others to switch off the lights when they are not using them since we do not have sensors. This happens when there is natural lighting, and I find people still with lights on.*

4.6.6 Libraries' Future Plans on Environmental Sustainability

It was noted that most libraries have plans to green the library infrastructure. They plan to develop into extensive green libraries now and in the future, with some of these plans enshrined in the bigger organizational goals and the hosting institutions. Most library employees were not involved in the building construction and design stages and noted that there are so many things they would want to be changed in the future to embrace green concepts. One respondent noted,

> *"I was not an employee here during the time of construction. I want to believe that they forecasted that the building would serve an increased population for almost 50 years. Therefore, a plan should be underway to develop initiatives to have enough energy to serve such a big population."*

On the other hand, a section of libraries showed that they do not have specific strategies and policies as a plan for environmental sustainability. Most greening initiatives and practices they undertake are sporadic, reactionary, and not necessarily planned. One participant noted, "We do not have policies or plans concerning the green libraries. However, it is a direction we are taking. It is something we have decided to embrace and improve once in a while. We have no choice."

4.6.6.1 Adopting Solar for Lighting and Other Energy Uses

Results revealed that solar was one of the significant plan considerations for most libraries that did not have it. One respondent noted, "Our library is such a new building, but I heard that they have a plan to adopt solar energy to save energy and embrace green

libraries." Another respondent emphasized a future plan to implement solar for energy need. They stated, "We currently do not have solar energy, but it is in the plan. We have been trying ways to reduce electricity bills. That is why I feel the library will embrace solar energy in the future."

4.6.6.2 Investment in Water Systems

The results showed that libraries incorporated investing in water systems in the plans as part of the greening initiatives. Investment in water systems would be possible through practices such as recycling water used in the library. One respondent explained, "We have a whole tank that serves the entire University, so I am not sure if that serves as part of the green initiative. It could be much better if we had a way to recycle the water used."

4.7 Results from the Reviewed documents

This study reviewed three key library documents: the library strategic plan documents, the library building blueprint documents, and the library budgets. Apart from the public libraries with a clear strategic plan document, the university libraries, school libraries and special libraries did not have a strategic plan document. Nevertheless, some of these libraries had well-articulated vision and mission statements as well as values of the libraries, clearly outlined in their library web pages which are publicly visible online. It was widely observed that green library implementation was missing in these libraries' vision and mission. This could explain the low performance of green library initiatives since the plans do not feature in the strategic directions of the libraries.

Regarding the blueprints of the library buildings, most libraries provided their blueprint with strict confidentiality conditions. In contrast, others could not offer it due to their policy, and some could not locate the document at the time of collecting data. The observed blueprint documents showed that only the modern library building is designed

considering environmental sustainability; for instance, libraries were designed with rooftop rain harvesting provisions.

The blueprints were also observed to have building design provisions of an atrium which ensures that the library lets in natural lighting, which helps save the use of electricity during the day. From the blueprint, it was also observed that libraries had designed bicycle parking spaces that can encourage users to use bicycles instead of motor vehicles, thereby reducing carbon emissions. Some buildings were also designed with indoor garden spaces that allowed for growing trees and flowers inside the library.

Regarding budget documents, it was observed that libraries were failing in budgeting for green library movement initiatives. Libraries did not have any special funds in the budget for establishing or promoting a green library. However, libraries with indoor gardens had some funds set for the garden's maintenance, including watering and removing weeds.

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.1 Introduction

The study's main aim was to establish the adoption of green library initiatives in Kenya for environmental sustainability. The following were the research objectives that guided this study:

i. Establish the perception of Kenyan librarians towards the concept of greening libraries for environmental sustainability.
ii. Assess the greening methods/practices adopted by Kenyan libraries.
iii. Determine the factors driving and impeding libraries' embracement and implementation of the green concept.
iv. Propose strategies to guide libraries in transforming into 'green libraries'.

Data was collected from academic, public, and school libraries across Kenya. Data was collected using semi-structured interviews, complemented by document review and observation.

The scope of understanding and discussion presented in this chapter is defined by the objectives and emerging themes from the study findings.

5.2 Librarians' Perception of the Concept of Green Libraries

The concept of green movement is still new among library institutions, especially among librarians in developing countries. It was therefore critical to establish whether Kenya librarians comprehend the concept of green library. Three emerging themes were observed from the discussion with librarians on what they perceived to be a green library including, green practices in the library, green services in the libraries, and eco-friendly library. This observation shows that green libraries in Kenya are those that have, incorporated the aspects of green movement in their practices, they offer services

considered to be green and they are eco-friendly that is they are enhance environment and avoid environmental harmful practices. The three emerging themes on how librarians perceive green librarians are expounded in the following section.

5.2.1 Green Practices in the Library

Green practices in the library were perceived as an indication of a green library. Some of the green practices identified by the librarian include considerations for natural light, planting trees, water conservation, limiting the use of resources, and use of digital libraries.

Across the sphere, the concept of green practices libraries has been adopted by many organizations as they focus on attaining environmental sustainability. The study indicated many libraries are yet to adopt the green practices fully. Okpidi-Urhibo (2023) urged institutions should embrace activities such as green information knowledge, green building, and green library services. According to this study, it is evidenced that the green concept in libraries is not new.

The perception of green libraries should not be based on having green buildings but also should incorporate the practices of the library users and staff and greener strategies. In this case, the participants in the study clearly indicated that they had the perception of the green concept and also showed that the libraries in Kenya had started adopting the idea. While the respondents used different terms such as lighting, renovating, ventilation, planting trees, redesigning, and digitalization, they all agreed that it focused on environmental sustainability and showed their understanding. The study findings showed that Kenyan university libraries perceive the greening concept positively and have adopted it in their libraries, although it has not been fully implemented. In adoption the library is moving towards the green library, however in implementation, due to resource

constraints the library has not fully integrated green library practices. According to the librarians a library is considered green if it incorporates one of several of the green practices which includes, planting of trees, proper waste management, architectural designs, natural lighting, and green services.

5.2.2 Green Services in the Libraries

The respondents acknowledged having some green library services to promote environmental sustainability. Among the green services in the library, green information literacy and green collection stood out as the leading green services in the library that portrays a library as a green library. The study findings established that adoption of green information literacy by the libraries varied; with the exception of a few libraries that have largely implemented the concept, others are either, just considering it while for others it has been incorporated it into their plans. Furthermore, most participants understood green information literacy practices such as campaigns and user education that they confirmed they were involved in. In line with this observation, Mutuku (2018) noted that green information literacy is expanding the already existing information and incorporating sustainable thinking and understanding of how the choice of information affects environmental sustainability. In addition, Hauke (2018) asserts that greening information literacy, creating awareness and educating users on the impacts of the source of information they use may affect the environment.

A significant percentage of Kenyan libraries have established green collections to provide more materials to promote awareness of environmental sustainability and be agents of the same. This has been achieved though selecting information materials with content that informs and review green practices (Mutuku, 2018). The views are consistent with the arguments of Mavily and Vasudevan (2019) that libraries that have already adopted or are

planning to adopt the green concept have a section of materials that promote environmental sustainability and also adopt ways such as having reading materials which generate less carbon footprint and reduce waste while creating more space.

5.2.3 Eco-Friendly Library

In terms of eco-friendly library, librarians perceived those libraries that are eco-friendly are a green library. The eco-friendly libraries are characterized by re-using and recycling of materials, reducing waste and toxic products, and developing alternative technologies. This study observed that libraries are also able to minimize tree cutting as they encourage online working, and printing is only done when absolutely necessary. As libraries users print less, fewer trees are cut, which creates environmental sustainability. Rickert (2019) concurred with the findings here noting that libraries are able to contribute on reduction on the number of trees cut down. However according to Rickert (2019) this is attained through the adoption of the practice of recycling office papers and discarding newspapers to manage paper waste, which has helped to reduce the number of trees cut down to make paper thereby reducing both water and air pollution. Evidently, the library has a role to play in minimizing the number of trees cut down either through encouraging use of online resources or through paper recycling.

Adopting green library buildings is significant to attain environmental sustainability. According to Mutuku (2018) when considering having green library buildings, it is essential to use performance standards such as Leadership in Energy and Environmental Design (LEED). LEED standards acknowledge that green buildings involve designing, building, renovating, operating, and reusing the building resource-efficiently. However, the study noted that most Kenyan libraries did not consider this as standard performance when setting up the library.

Most of the participants concurred that use of vegetative roofing and having live plants inside libraries is a critical practice that embraces green concepts and energy efficiency. However, while the libraries have only considered and adopted planting trees in their environment as an aspect of greening, few have adopted the use of vegetative roofing. This contrasts with other practices where library buildings are fitted with actual greenery and vegetation, which involves choosing drought-resistant vegetation to maintain air conditioning within the library thereby reducing heat (Binks et al., 2019).

5.3 Greening Practices/Methods Adopted by Kenyan Libraries

Green libraries in Kenya are perceived in terms of the green practices incorporated in their library practices. Accordingly, the study engaged the librarians in a discussion to determine what green practices/methods are adopted by Kenyan Libraries. While Librarians perceived green library concept as the presence of green practices in the library, it should however be noted this was not an outright indication of the adoption of the green practices in the library and hence it was necessary to establish what green practices were adopted by Kenyan libraries. The dialogue with the Kenyan librarians revealed a few number themes that pointed to the green practices adopted by Kenyan libraries namely, water efficiency, energy efficiency, air quality, user awareness, and renewable construction materials.

5.3.1 Water Efficiency

Water has continued to be scarce which has made it necessary to efficiently use water to ensure it remains available. The primary goals of water efficiency is to minimize water consumption which helps in saving energy and improving environmental sustainability. The LEED standards identify portable water, black water, grey water, and processed water as ways of providing water efficiency. The participants in this study confirmed that

the libraries are following some of these standards to ensure water efficiency is achieved. Water conservation is an essential aspect of the going green concept. Fresnido and Esposo-Betan (2017) noted that water efficiency in green libraries could be achieved by maximizing rainwater such that roofs are designed to capture the rainwater stored for other services like cleaning or watering plants. The participants from the libraries supported this aspect by confirming that they conserve water by using it to water the indoor plants and flush fixtures within the building. Cheng et al. (2016) noted that currently, buildings have waterless urinals, which would help cut water usage. However, the participants never mentioned having such a feature in their libraries to adopt the greening concept. This calls for its adoption.

5.3.2 Energy Efficiency

Energy efficiency is vital to the commitment to building green. Across the globe, many libraries' buildings are energy efficient through the adoption of different methods such as natural lighting and solar panels. Okpidi-Urhibo (2023) supports this by stating that using renewable sources and ensuring efficient lighting is necessary to achieve energy efficiency. The study's results showed that the Kenya-based libraries commit to attaining energy efficiency in their operations. The library buildings are designed to have huge windows and fit buildings designed with atriums that ensure enough natural lighting. The use of renewable energy sources such as solar is essential since they are cleaner energy sources per USGBC LEED standards.

Solar panels are examples of clean sources of energy that help promote energy efficiency as a way of adopting the greening concept. Some libraries had intentions to adopt solar systems, which are energy-saving, as alternative sources of energy. The participants in the study confirmed that most of their libraries used solar energy in areas that natural lighting

would not reach at night. When solar energy is maximized in the libraries, the electricity bills reduce and still energy is conserved as a way of environmental sustainability for the future. This is because natural resources are depleted daily, which calls for conservation.

Using natural lighting is a practice that is rampantly being adopted in many libraries across the globe to maximize energy efficiency. According to Wakhungu (2021), libraries are currently built and renovated by maximizing the green concept, which involves the installation of large windows that allow natural lighting and cut the usage of artificial lighting during the day. Following the study results, most libraries in Kenya embraced large windows and maximized colour paintings, murals and floors promoting natural lighting. Others are planning to renovate and redesign their buildings to enhance natural lighting as a way of greening. This is also very attractive to users since people enjoy spending time in areas with natural sunlight since it is more friendly, especially for the readers.

5.3.3 Air Quality

Air quality in a library determines productivity and provides comfort to library users. Okpidi-Urhibo (2023) stated that sustainable library buildings are very well designed with the proper aeration, fresh air, and prevent irritation and weariness. The librarians from the libraries that have embraced the greening concept supported this by confirming that, indeed, their libraries are specially arranged and have spacious sections to allow airing. The pictures attached in the findings section attained through observation prove that the libraries in Kenya are built to be spacious and arranged in a way that there is ventilation. Also, the presence of live plants inside the buildings ensures that there is enough oxygen for the users in the rooms and that the air does not stay stagnant. Many libraries globally have adopted this greening method to make most of the natural lighting. The results of the

study support the arguments above, and it is clear that they have roofs designed in a way that they harvest water and also face sunlight to maximize natural lighting. For the buildings that plan to have vegetative roofing, site selection is very important since it is located in a way that the rainwater can sustain the vegetative roofing and bring cooling effects to rooms that could be suffering from the heat island effect.

5.3.4 User Awareness

Information is power; thus, libraries raise awareness of environmental sustainability and adoption of the greening concepts to their users, employees, and the community at large. Library management establishes workshop programs and conferences to create awareness on environmental sustainability and greening initiatives (Mutuku, 2018). The libraries invite environment sustainability experts to share knowledge on greening initiatives with library users during the workshops and conferences. Posters are also used to disseminated information and create user awareness. Collaboration with the community through community programs also facilitated user awareness of environmental sustainability. Having a section of collection for environmental sustainability is very important in creating user awareness (Wakhungu, 2021). The libraries in Kenya have collections on matters of environmental conservation, which help create awareness among users.

5.3.5 Renewable Construction Materials

Construction materials that are considered renewable are those that can be easily recycled or replaced without causing any gas emissions or pollution. Such materials could be recyclable materials and also timber. Libraries looking into adopting the greening concept have been fitted with materials such as bamboo, recycled stone and other non-toxic materials that are majorly manufactured away from the building site. To improve sustainability the libraries involved in the study confirmed that they focus more on

internet usage such as communication through emails and WhatsApp groups as well as putting signatures online. Going paperless is an essential aspect of environmental sustainability. It cuts on the usage of papers which are derived from trees. This means there will be less cutting of trees, which is part of the greening concept in the United Nations Sustainable Development goals. Further, costs of printing materials and electricity are reduced, and waste becomes manageable. The efforts by the Kenyan libraries concur with the idea of Fresnido and Esposo-Betan (2017) that the process of embracing environmental sustainability needs the libraries to go paperless to limit the effects on the environment.

5.4 Factors Driving and Impeding Libraries' Embracement and Implementation of the Green Concept

Implementation of the green concept in Kenyan libraries is subject to several factors. In the discussion with Kenyan librarians the following themes emerged, implementation costs, management policies, stakeholder awareness, and technology.

5.4.1 Implementation Costs

Findings revealed that the libraries in Kenya fail to exercise some greening practices due to increased cost. Most of these green practices are expensive, making the whole activity expensive and only libraries that get adequate funding, are able to implement green library practices. Fang et al. (2023) presented affirms this observation that the cost of green buildings is more expensive than general buildings. This is because of incorporating of green building systems such as energy-efficient appliances, equipment, and lighting. They increase the construction costs by 10.77% compared to traditional buildings. Wakhungu (2021) also agreed to this noting that the substitutes of wood such as compressed wheat board costs more than ten times of the ordinary price of wood. High

costs are incurred when searching for green alternatives during certification of buildings and this contributes to the high-cost premium of constructing green buildings. Compared to other entities Bhattacharya (2017) noted that the other entities find the construction to be affordable due to availability of funding, but libraries face the challenge of cost when meeting green goals. This is notably due to being subjected to stringent budget cuts especially when it comes to reconstructing or reengineering library buildings and structures. One of the objectives of the greening concept is to achieve cost-effectiveness. However, this is not the case as the utilization of green techniques such as energy and water saving equipment, high performance insulation protection increases the capital cost (Okpidi-Urhibo, 2023).

5.4.2 Management and Policies

Implementing greening strategies in libraries relies on the support from the management and the policies put in place. As it is with organizational operations, big projects such as construction, redesigning and purchases cannot even kick off without management's approval. If the top management is not committed to environmental sustainability, implementing green strategies that support environmental sustainability becomes hard. This correspond to the norm activation theory, where it is assumed that the library management awareness of green library movement is reflected with greening policy in the library, which is followed by motivation of librarians to adopt and spearhead greening practices. The library management goes to an extent of evaluating the greening practices and ensure that the library is adhering to the green movement policies (Okpidi-Urhibo, 2023). Similarly, in line with the VBN theory if altruistic norms and personal moral norms engrained on the aspiration for value, penetrate deeply in libraries, green library practices and sustainability will be a key matter for libraries policies (Mutuku, 2018).

Libraries worldwide can use the standards of LEED to design green buildings and create pro-sustainable environment. The standards would motivate them to adopt and implement the green initiatives in libraries and their environments. This notion is consistent with the findings of this study suggesting the need to align greening efforts by libraries with international best standards of green spaces and environmental sustainability. In Kenya, national environmental laws and institution-specific policies should guide adoption and implementation of green library initiatives.

5.4.3 Stakeholders Awareness

Stakeholder awareness is one of the factors that drove implementation of green libraries. Substantial evidence suggested that libraries wholly get involved and create awareness of the greening initiatives toward a sustainable environment. This includes appointing environment ambassadors to help promote environmental sustainability. Moreover, more libraries reported conducting education as a way of creating awareness. In line with this observation, Bhattacharya (2017) asserts that awareness leads to collaboration between the local community and the member of the library when designing and implementing sustainable practices that establish a green library culture. Involving all stakeholders allows them to have vested interest in the common goal and this enables members to act purposefully which increases learning through participation. In line with findings here, the norm activation model poses different backgrounds to predict pro-environmental behavior among libraries. They include awareness of green library concept, personal norm mirrored on the greening methods or practices adopted by Kenyan libraries, and acknowledgement of responsibility reflected on the responsibility of the library to establish strategies to guide libraries in transforming into ‘green libraries’.

5.4.4 Technology

Technology is a notable factor that can hinder or facilitate implementation of the green concept. Because of the ever-changing technology, the reliability and effectiveness of the new products used in going green hinders many professionals from giving specifications for green buildings. In line with this observation Lam et al. (2010) identified the lack of knowledge on the durability of green materials and green technology as significant barriers for implementing green strategies in the construction of libraries. Further, Shi et al. (2013) opined that incorporating green construction techniques can bring issues in the architectural design of the building such as installation of solar water heaters and panels which may increase the time spent during integration with the materials used on the roof.

Most libraries reported using technology in creating awareness of environmental sustainability. Green information literacy and user education has helped library users to understand the direction the libraries are taking globally using green initiatives. The results indicated that most libraries acknowledged that communication does not need to be done through written papers and can be done electronically to embrace and fully adopt the greening concept. Similarly, Hasan and Zhang (2016) notes that the knowledge and cognition on sustainability of all stakeholders including designers, policy makers, the public and the construction personnel needs to be enhanced further.

5.5 Strategies that Guide Libraries in Transforming into 'Green Libraries'

Strategy is crucial in attaining organizational goals and objectives. Consequently, in the goal of transforming libraries to green libraries, librarians have had to take a strategic approach. The discussion with the Kenyan librarians raised a number of themes that define the strategies that guide libraries in transforming into green libraries including, networks and partnership in environmental sustainability, green building and

maintenance, recycling, using ICT and internet, ICT greening initiatives, and raising awareness of environmental sustainability.

5.5.1 Networks and Partnership in Environmental Sustainability

The libraries studied indicated that they have many partners such as institutional departments and government institutions like NEMA and Kenya Forest Service. These partnerships are beneficial, especially when there are campaigns, events or green projects. The stakeholders in these institutions would ordinarily sponsor the events and activities, making them less costly. More so, these partnerships bring together parties with a similar goal of environmental sustainability. Participants of this study noted that there is a need for Kenyan libraries to expand their networks and partnerships.

Networks and partnerships are very crucial when it comes to organizational relationships, growth, and environmental sustainability. Libraries, like other institutions, need partnerships to embrace green concepts. Some of the notable networks focused on environmental sustainability include the International Federation of Library Institutions & Associations (IFLA), United Nations Environmental Program (UNEP), TreeHugger, and National Defense council. If libraries partner or get involved in events and activities of such networks focused on environmental sustainability, they easily achieve their environmental sustainability goals.

5.5.2 Green Building and Maintenance

The study revealed that most of the existing libraries already have modern structures; for those that are very old, they have some flexibility for renovations and design facelifts. This means they can readily embrace the greening concept, ensuring building transformation per the LEED standards. Modifying the libraries can either be done through adaptation or renovation, where the system and features of the buildings are

redesigned, as noted by Kodnikar et al. (2018). The participating libraries were designed in a way that allowed for future expansion. Creating more open space in the library sections to allow natural lighting and fresh air flow is essential since all libraries considered natural lighting as an aspect of the green concept. Redesigning can be done such that big windows are fitted to ensure enough natural lighting comes through; other structural renovations that libraries can do are fitting vegetative roofing that allows fresh air and brings a cooling effect to the building and installing solar panels as an alternative energy source. Atriums are fitted to let in enough lighting while new roofing systems are implemented in a way that they can harvest water. The participants in the study confirmed that all of these are done to transform the libraries into green libraries. In addition, none of the libraries used bamboo, as much as it can be easily recycled.

5.5.3 Recycling

Recycling computers is not a very common practice. However, some organizations are involved in recycling and repackaging used computers. Since the depreciation rate of computers and obsolescence has increased over the years, the careless disposal of old machines and subsequently increased manufacture of new computers continues to threaten environmental sustainability. The study established that when old computers are replaced in the library, it becomes very difficult to dispose of in a way that will not harm the environment. As a result, many libraries across the globe have adopted another strategy where they buy refurbished computers and recycled toner cartridges (Okpidi-Urhibo, 2023). This study established that most libraries have already adopted this strategy such that they buy refurbished computers and also sell the old computers to companies that refurbish them and sell them to other people at cheap and affordable rates. This strategy is very eco-friendly and maximizes proper waste management. Good waste management is a sustainable practice in going green. Additionally, it helps reduce the

health effects on humans since, as stated by Rickert (2019), computers have high levels of lead content which is likely to affect the human body.

5.5.4 Using Electronic Media

Libraries going green have increasingly embraced electronic media to reduce paper use in the offices. Internet communication for office work and adopting digital signatures are some strategies for reducing the carbon footprint emitted via paper. Tella et al. (2019) concurs by noting that many libraries across the globe use an online catalogue rather than the traditional card catalogue made of paper. Most internal and external communications are done through electronic media such as email, social media, and websites. This is very economical since less paper and energy is used compared to the practice previously adopted. In concurrence with this assertion, most respondents confirmed that they have plans to go paperless. Further, they confirmed that they use the internet for communications and make approvals online using their digital signatures. Notably, online meetings were reported to be a strategy for reducing the high carbon footprint that results from air travel, vehicular road travel and train travel to attend meetings and conferences. It was evident that most libraries have not entirely gone paperless. Still, at least they have cut down on paper use, which has helped promote environmental sustainability. To serve users better, Wakhungu (2021) notes that the use of internet media such as Facebook, Twitter, email, websites and blogs should be a way of cutting down on the use of paper such that even library users get to give their feedback and reviews about the library experience online.

5.5.5 ICT Greening Initiatives

Using ICT initiatives to go green is vital in saving the energy used in the libraries. Datta (2015) stated that switching off computers and other electronics helps bring the cooling

effect at the centres and reduces the amount of electricity used through a power management software. The respondents in the study proved to have adopted this strategy where they indicated that most libraries had set rules that everyone should shut down their computers when not using them. The application of VBN theory is quite evident because switching off the computers after use has to do with the personal values of the individuals using the computers. Individuals with a different view of environmental sustainability will still leave the computer on even when it is not in use. To counter this, participants reported having reminders and notices at strategic locations in their libraries to remind people to switch their computers when not in use.

Teleconferencing is another component of ICT greening initiatives that aims to promote environmental sustainability. In many cases, library staff have always travelled worldwide for conferences, benchmarking and library exchange programs among others, increasing the pollution caused by aircraft. According to Hauke et al. (2021), libraries across the world have adopted teleconferencing where library staff travel less hence reducing the impact of pollution on the environment. The findings of this study indicated that librarians also perceived teleconferencing as an ICT strategy for promoting environmental sustainability.

5.5.6 Raising Awareness of Environmental Sustainability

Notably, lack of awareness came out as a very substantial hindrance to environmental sustainability. Information is power, and people are less likely to promote environmental sustainability if they are unaware of the positive impacts of going green. When informed of the standard greening concepts and initiatives, the stakeholders in various libraries and communities will be aware of the roles they can play in achieving environmental sustainability. Bhattacharya (2017) affirms that awareness results in a collaboration between the library stakeholders, NGOs, community, and other institutions that can jointly implement

eco-friendly initiatives. This partnership, she says, can also propel libraries to attain green standards effortlessly due to the shared vision. Librarians in the study agreed that they also relied on awareness and sensitization to gain collaboration and partnership with users and the community. They used different means like social media and online platforms such as blogs, wikis and websites to create awareness where they posted content about going green. Further, they confirmed to involve themselves in various partnerships with local and international organizations to create awareness, especially during events involving the local community. A good example is tree planting.

5.6 Chapter Summary

Environmental sustainability preserves and conserves natural resources for future generations. Therefore, it is imperative that every organization incorporates a holistic approach to greening their buildings and services as part of the future plans to remain in existence. Adopting green initiatives by libraries is possible only if significant changes are made, for instance, relooking at how electricity as a form of energy is limited, harvesting and recycling of water and other resources, and embracing alternative energy sources such as solar. Many libraries across the globe tend to have green initiatives and standards embedded in their strategic plans and policies to ensure the full adoption of green concepts for environmental sustainability. The participants in the study stated that the libraries they represented had major plans for the future that aimed at promoting environmental sustainability. Most respondents highlighted the adoption of solar systems, harvesting of water and development of environment-friendly policies as some of their immediate future plans for going green. Their objective, in the end, is to reduce their carbon footprint through.

CHAPTER SIX

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

6.1. Introduction

The study's main objective was to examine the greening practices and initiatives adopted by Kenyan libraries to preserve the environment sustainably and recommend appropriate strategies that all libraries in Kenya can use to go green entirely. The call for 'going green' is supposed to be a response to the United Nations Sustainable Development Goals (SDGs) that require organizations to take urgent action to combat climate change and its impacts. A qualitative approach was used where data was analyzed using NVivo with the findings presented above.

6.2 Summary of the Results

This chapter provides a summary of the findings grounded on the research questions. As presented in the preceding chapters, the investigation was guided by four objectives.

i. Librarians' Perception of the Concept of Green Libraries

The first research objective aimed at assessing Kenyan libraries' adoption and perception of green initiatives such that the researcher would ascertain how they perceive green libraries and how far they are in going green. During the interview sessions, it was found that green libraries are not new to them, as evidenced by their frequent use of terms such as water harvesting, waste management via recycling, planting trees, green building redesign and use of natural lighting. The green concept in the Kenyan libraries is still taking shape compared to the business world, where it has already taken form. Most participants described their libraries as partially green following the practices they were involved in and revealed that the libraries have a lot of good plans for the future in going fully green while also impacting the mindset of library users and the communities around

them. The results also revealed that the libraries in Kenya are offering green services such as user training on environmental sustainability by designated librarians, green collection lending services, digital library services, awareness campaigns spearheaded by energy management committees etc.

ii. Green Practices adopted by Kenyan Libraries

The study's second objective sought to assess and understand the practices and activities that the Kenyan libraries were involved in to go green and their understanding of environmental sustainability. The exploration sought to answer questions such as what would identify them as green libraries. Upon further probing, it was found that libraries in Kenya have adopted greening initiatives such as architectural building designs with atriums and green roofing, maintenance-friendly and ecofriendly construction, zoning of lighting, redesigning as per LEED standards, coming up with bicycle parking spaces, recycling, and reuse of resources among others. Moreover, the findings confirmed that efforts to go green in the library majorly affect the surrounding environment of the library by providing a more conducive climate through cleaner air for reading and less carbon footprint impact on the society.

Regarding the participation of libraries in greening initiatives, results revealed that all libraries in Kenya recognize participation in the greening initiatives as a good strategy for supporting the United Nations Sustainable Development Goals on preserving natural resources for a sustainable future. However, most of the libraries did not participate in such endeavors. The small percentage that participated in the greening initiatives reported to have done so through umbrella organizations such as the parent universities, which have a school of environmental science or climate control. Many libraries had embraced the green concept to be at par with the world order. With this adoption, they ensured

redesigns and upgrades to conform to LEED standards of green buildings. In Kenya, vision 2030 was acknowledged as one of the policy factors that influenced the libraries to embrace the green concept. The libraries have been embracing and implementing green initiatives in line with the policies of vision 2030.

The study used the USGBC LEED standards and the IFLA ENSULIB green library checklist to establish green libraries' adoption in Kenya and measure performance. Figure 6.1 highlights the extent of adoption of green initiative by Kenyan libraries and Figure 6.2 highlights the extent of adoption of key green initiatives by Kenyan libraries using IFLA checklist.

iii. Determine the factors driving and impeding libraries' embracement and implementation of the green concept.

While implementing the green concept, some challenges barred the libraries from effectively going green. This included: inadequate financial facilitation, lack of awareness and understanding of the green concept, lack of clear policies and strategic plans to guide implementation, organizational culture, and lack of interest from the library users and the management. Some of the projected solutions to these challenges included: increasing green information literacy, emphasizing the role of leadership in setting up eco-friendly buildings, local practical solutions such as improving lighting, development and adoption of policies and standards such as the LEED building standards, and better waste management.

iv. Strategies that Guide Librarians in Transforming to Green Libraries

The fourth objective aimed at establishing and proposing strategies that can play a significant role in going green in libraries by guiding the libraries in their transformation

journey. Notably, many libraries use strategies such as architectural innovations and renovations to transform into green libraries. The libraries adopted other methods such as attending special greening events, setting targets for the tree planting days, and raising awareness while incorporating many stakeholders. Architectural innovations and renovations that guided the libraries in their effort to achieve greening included green garden spaces, green roofs, and provisions for natural lighting. Remarkably, many libraries achieved less energy consumption through natural lighting provisions enabled by installing large windows, creating spaces within the library, and using atriums on their roofs. Further, the libraries recorded the adoption of solar energy and LED bulbs to help conserve energy.

The libraries were more intentional in finding ways to cut electronic waste. The libraries reported using technology to reduce electronic waste, which has become the hardest to dispose of. This was characterized by more internet usage for communication purposes and the use of refurbished computers. To further cut electronic waste, libraries reported partnering with companies that refurbish disposed or outdated computers and machines.

The libraries in Kenya confirmed that participating in annual greening events such as tree planting, cleaning nearest towns and marketplaces aimed at environmental sustainability contributed to their going green initiatives. They are also involved in partnerships and networks with international bodies such as IFLA and UNEP that strategically promote environmental sustainability through green initiatives. Libraries have partnered with local forest service departments to encourage tree planting and international bodies to observe the world environment or tree planting days. According to the results, the libraries intend to be strategic by incorporating more partnerships in future that can support them

financially and in terms of capacity building to create more awareness about environmental sustainability.

Libraries were reported to have campaigns to create awareness of the greening initiatives toward a sustainable environment. Most libraries reported using ICT in creating awareness of environmental sustainability. Green information literacy and user education has helped library users to understand the direction the libraries are taking globally using green initiatives. Notably, the green concept is effectively and successfully taking shape in Kenya, specifically in public and academic libraries. As a result, respondents reported that many libraries that benchmark with them have indicated their desire to build fully green libraries or renovate their existing buildings to incorporate environmental sustainability as a standard of measure and quality control. All libraries in the study confirmed that they intend to improve their structures and policies to go green fully, just like the libraries in developed countries. Adoption of solar energy, green roofs, improved water systems, more partnerships on greening, and proper waste management are some of the plans by the libraries that can be used to achieve this.

6.3 Conclusion

This research sought to fill the gap on the scope and level of adoption of green initiative to promote environmental sustainability in libraries in Kenya. The findings sufficiently demonstrated that green libraries had been embraced and adopted partially, and the libraries are actively involved in environmental sustainability with practices aimed at reducing the carbon footprint in the environment, thereby playing a big role in reducing the climate change effects and responding to Sustainable Development Goals. Libraries in Kenya, under their umbrella organizations, have taken advantage of their knowledge of greening concepts through the adoption and implementation of greening practices and

coming up with strategies to enhance green libraries and promote environmental sustainability. They have done this majorly through redesigning and renovating to meet the ever-changing user demands in line with the green concept. Therefore, this study concludes that librarians in the Kenyan libraries are aware and understand the green building concepts and have embraced and adopted different green initiatives, albeit partially to reposition and guard their position across the globe.

Measuring and judging policies should not be by their meaning but by their performance and effectiveness. The traditional approach of measuring policy effectiveness focuses on the level of adoption of green initiatives rather than the achievements of the results of the already put in place objectives. This study did not measure the level of environment policy effectiveness in promoting green library initiatives. Therefore, this study could not ascertain whether libraries achieved or not achieve the adoption of green initiatives.

Achieving green libraries is not a distinctive project; rather, different stakeholders ought to come into play and library users are part of these stakeholders. This exploration concludes that overlooking stakeholders such as library users to whom the reason for greening libraries is essential is detrimental to the achievement of the greening concept. They should be involved through education, creating awareness and participating in programs and conferences aimed at environmental sustainability.

Despite the libraries in Kenya fully or partially adopting the green concepts and initiatives that promote it, there library users are reluctant. They have persistently shown a lack of awareness concerning greening initiatives. For the library to achieve its greening objectives, users are stakeholders and have a role to play. This study showed inadequate involvement of librarians in the greening practices. However, user involvement in the green library initiatives was not investigated in the study.

In the process of the adoption of green initiatives in libraries, challenges are projected. Most of these challenges root from the management goodwill and buy-in and operations that make up the environmentally sustainable practices of a library. Most of the processes and decisions concerning environmental sustainability adhere to the proposed theories; norm-activation model and value belief model where most decisions are made depending on the belief and behaviors of the managers and staff and not in the best interest of the institution. Most of the challenges noted are internal, meaning that the organization can devise mechanisms to solve them. The challenges realized did not alter the adoption of the greening initiatives in a big way. Therefore, the study concludes that challenges encountered are part of any scheme if they are internal.

6.4 Recommendations

This section of the study suggests recommendations for practice and further research based on research objectives and the conclusion.

6.4.1 Proposed Strategies to Guide Libraries in Transforming into 'Green Libraries'

6.4.1.1 User Involvement

One of the main reasons for embracing green libraries is because they create a conducive environment with aesthetic reflections for users. This means library users are essential stakeholders in the green library movement/campaign. The users should be involved or at least be allowed to contribute to the decision-making process concerning the greening of the library since they are also beneficiaries. This calls for all the libraries to have a representative body for users where they discuss matters concerning the library and bring forth conversations on global challenges such as climate change that require action by all stakeholders.

The user groups that can serve as green library ambassadors should have representatives who can be part of the decision-making in the library concerning environmental sustainability. Furthermore, having this team of environmental sustainability ambassadors is likely to prevent many internal challenges that libraries encounter following wrong decision-making by management, either due to their behaviors or beliefs on environmental sustainability. In some cases, the managers do not appreciate or value environmental sustainability, thereby making uninformed decisions that usually may favor the cause of preserving and protecting the environment. User involvement in green initiatives goes a long way in developing and sustaining an organizational culture of sensitivity to preserving the environment for use by future generations.

6.4.1.2 Improve performance and Growth Measuring Metrics

To determine how much libraries ought to have achieved in adopting greening initiatives, there is a need to use nontraditional measuring metrics to assess performance. The current measuring metrics look into the end result of the objective and not its meaning. This way, the libraries can understand how adopting green initiatives has enhanced the library's primary goals. Notably, most green libraries expect to accommodate and serve as many users as possible, cut electricity bills and promote environmental sustainability since they are agents of environmental conservation. To determine the performance of green libraries, the libraries should see if the highlighted objectives have been achieved. If not, the library management should strategize and benchmark more until the end results are achieved.

The respondents noted that going green through adopting electronic resources was meant to reduce the carbon footprint created during the process of producing print material. However, most of the online resources are cloud-based and although their carbon footprint was not investigated, the study recommends that libraries need to interrogate the

environmental impact of cloud technologies being used to power electronic resources and whether they have measures in place such as green technology/ICT to reduce their carbon footprint.

6.4.1.3 Maintain Green Library Standards as Guided by the IFLA ENSULUB Green Library Checklist

For any construction project, just as for any complex undertaking in general, a checklist provides a practical means of confirming that everything has been considered. Although it cannot claim to be exhaustive, the following list of aspects of planning, construction, and library operation, is designed to help ensure that everything has been considered. The librarians intending to go green can follow the IFLA ENSULIB green library checklist (IFLA 2013).

The Green Library Checklist, "Sustainable buildings, equipment, and management. A checklist" was originally published in German/English and translated to Swahili by Arnold Mwanzuin: The Green Library = Die grüneBibliothek. The challenge of environmental sustainability / ed. on behalf of IFLA by Petra Hauke, Karen Latimer and Klaus Ulrich Werner. München/Boston: De Gruyter Saur, 2013. VIII, 433 pp., ill. (IFLA Publications, 161) ISBN 978-3-11-030972-0. Available online, as open access/under an open access license. The checklist has been published on the IFLA website and translated by the researcher to Kiswahili (Appendix J).

6.5 Recommendations for Further Research

This study explored the adoption of green library initiatives in Kenya for environmental sustainability with a view of proposing strategies that can be used to guide libraries in the going green transformation. The effectiveness of the green library may be affected by

other factors beyond this study. It is therefore apparent that further research can be carried out stemming from the gaps identified in this study as below:

i. While establishing the comprehension and perception of Kenyan librarians towards the concept of greening libraries for environmental sustainability. It was found that librarians are aware and active in environmental sustainability and that the green concept in the Kenyan libraries is still taking shape compared to the business world, where it has already taken shape. Further research needs to be done to assess the impact of the librarians environmental sustainability actions through green libraries.

ii. While analyzing the greening methods/practices adopted by Kenyan libraries. It was found that libraries in Kenya are involved in greening practices such as architectural designs such as the use of atriums and green roofing, maintenance of eco-friendly constructions, zoning of lighting, redesigning, and coming up with bicycle parking spaces. However, it was not clear whether the green initiatives adopted have reduced the carbon footprint substantially, thereby influencing environmental sustainability and reducing climate change effects. There is a need for further study to measure and establish the effects.

iii. In determining the factors driving and impeding libraries' embracement and implementation of the green concept. It was found that while implementing the green concept, there were challenges that barred the libraries from effectively doing it; inadequate facilitation, lack of understanding of the green concept, organizational culture and lack of interest from the library users. Further research is recommended to identify policy gaps in institutions championing environmental sustainability through green initiatives, with the possibility of developing a framework for a sustainable green culture.

iv. While proposing strategies to guide libraries in transforming into ‘green libraries’. This study’s output were strategies that provide libraries with guidelines and suggestions for transforming to green libraries. Further research can be conducted to validate these strategies and measure their effectiveness in ensuring environmental sustainability.

v. It is essential that additional research is undertaken to assess the driving factors that led to green library centres of excellence, which have been well documented and even won awards of recognition for outstanding green transformation. This study would establish the driving factors of pro-environmentalism while exploring the adoption of green libraries in Kenya.

REFERENCES

Abbey, H. N. (2012). The green archivist: a primer for adopting affordable, environmentally sustainable, and socially responsible archival management practices. *Archival Issues*, 34(2),91-115.

Abtahi, E. S. (2015). The Role of Modern Atriums in a Framework of Sustainable Architecture. *J. Appl. Environ. Biol. Sci, 5*(12), 521-525.

Adom, D., Adu-Gyamfi, S., Agyekum, K., Ayarkwa, J., Dwumah, P., Abass, K, & Obeng-Denteh, W. (2016). Theoretical and conceptual framework: Mandatory ingredients of a quality research. *Journal of Education and Human Development, 5*(3), 158-172.

Afacan, Y. (2017). Sustainable library buildings: green design needs and interior architecture students' ideas for special collection rooms. *Journal of Academic Librarianship, 43*(5), 375-383.

Afroz, Z., Gunay, H. B., & O'Brien, W. (2020). A review of data collection and analysis requirements for certified green buildings. *Energy and Buildings, 226*(1), 313-328.

Ahn, Y.H., Pearce, A.R., Wang, Y., & Wang, G. (2013). Drivers and Barriers of Sustainable Design and Construction: The perception of Green Building Experience. *International Journal of Sustainable Building Technology, 4*(1), 35-45.

Akintunde, E. A. (2017). Theories and concepts for human behavior in environmental preservation. *Journal of Environmental Science and Public Health, 1*(2), 120-133.

Alexander, S. (2021, February 1). 2020 year in review: LEED certification. USGBCU.S. Green Building Council. Retrieved February 28, 2021, from https://www.usgbc.org/articles/2020-year-review-leed-certification

Alkaabi, N., Cho, C., Mayyas, A., & Azar, E. (2020). A data-driven modeling and analysis approach to test the resilience of green buildings to uncertainty in operation patterns. *Energy Science & Engineering, 8*(12), 4250-4269.

Al-Saadi, H. (2014). Demystifying Ontology and Epistemology in research methods. Unpublished doctoral research thesis), University of Sheffield, UK. Retrieved July, 17, 2019, from https://www.studocu.com/row/document/university-of-ghana/problems-of-philosophy/demystifyingontologyandepistemologyinresearchmethods/13671962

Amakiri, D., & Juliet, E. G. (2018). Ontological & Epistemological Philosophies underlying Theory Building: A Scholarly Dilemma or Axiomatic Illumination–The Business Research Perspective. *European Journal of Business and Innovation Research, 6*(2), 1-7.

American Library Association. (2015). 2015 ALA Annual Conference. "Resolution on the Importance of Sustainable Libraries.," 2014–2015. Retrieved July 17, 2019, from

http://www.ala.org/aboutala/sites/ala.org.aboutala/files/content/governance/council/council_documents/2015_annual_council_documents/cd_36_substainable_libraries_resol_final.pdf

Ansari, N. Y., Farrukh, M., & Raza, A. (2020). Green human resource management and employees pro-environmental behaviours: Examining the underlying mechanism. *Corporate Social Responsibility and Environmental Management, 28*(1), 229-238.

Antonelli, M. (2008). The green library movement: An overview and beyond. *Electronic green journal, 1*(27), 1-11.

Antonelli, M., & McCullough, M. (Eds.). (2012). Greening libraries. Library Juice Press, LLC.

Antonopoulos, C. A. (2013). Diffusion of Energy Efficient Technology in Commercial Buildings: An Analysis of the Commercial Building Partnerships Program. Dissertations and Theses. Paper 1532. https://doi.org/10.15760/etd.1532.

Asenahabi, B. M. (2019). Basics of research design: A guide to selecting appropriate research design. *International Journal of Contemporary Applied Researches, 6*(5), 76-89.

Asiamah, N., Mensah, H. K., & Oteng-Abayie, E. F. (2017). General, target, and accessible population: Demystifying the concepts for effective sampling. *The Qualitative Report, 22*(6), 1607.

Asim, M., & Ahmad, P. (2022). Adopting Green Practices: Challenges for University Libraries of Pakistan. *Library Philosophy and Practice, 2022*(7153.), 1-8.

Aspers, P., & Corte, U. (2019). What is qualitative in qualitative research. *Qualitative sociology, 42*(2), 139-160.

Asunta, P., Viholainen, H., Ahonen, T., &Rintala, P. (2019). Psychometric properties of observational tools for identifying motor difficulties–a systematic review. *BMC pediatrics, 19*(1), 1-13.

Aulisio, G. J. (2013). Green libraries are more than just buildings. *Electronic Green Journal, 1*(35), 1-10.

Aytac, S. (2019). Library Environment Sustainability Progress Index (LESPI): Benchmarking Libraries ' Progress Towards Sustainable Development. IFLA WLIC 2019, (IFLA), 1–11. Retrieved from http://library.ifla.org/2443/1/156-aytac-en.pdf

Azizi, N. S. M., Wilkinson, S., & Fassman, E. (2015). Strategies for improving energy saving behaviour in commercial buildings in Malaysia. *Engineering, Construction and Architectural Management, 22*(3), 327-346.

Babak, R., Mohammad, Z. S., & Hadi, H. (2020). The Impact of Green HRM Dimensions on Sustainable Organizational Development. *Journal of Teaching in Marine Science, 7*(20), 93 To 108.

Baden, D., Peattie, K., & Oke, A. (2020). Access Over Ownership: Case Studies of Libraries of Things. *Sustainability, 12*(17), 7180.

Bangar, M. S. (2018). Green Libraries in India: An Overview. *Knowledge Librarian, 2394*(2479), 222-230.

Barnes, L. L. (2012). Green Buildings as Sustainability Education Tools. *Library Hi Tech 30*(3), 397-407.

Berawia, M. A., Miraj, P., Windrayanic, R., & Berawic, A. R. (2019). Stakeholders' perspectives on green building rating: A case study in Indonesia. *International Journal of Technology, 5*(3), 13-28.

Beutelspacher, L., & Meschede, C. (2020). Libraries as promoters of environmental sustainability: Collections, tools and events. *IFLA Journal, 46*(4), 313-328.

Binks, L., Braithwaite, E., Hogarth, L., Logan, A., & Wilson, S. (2014). Tomorrow's green public library. *Australian Library Journal, 63*(2014),301–312.

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative research journal, 9*(2), 27-40.

Brennan, M. C., & Cotgrave, A. J. (2014). Sustainable development. *Structural Survey, 32*(4), 315-330.

Brink, R. (2018). A Multiple Case Design for the Investigation of Information Management Processes for Work-Integrated Learning. *International journal of work-integrated learning, 19*(3), 223-235.

Buys, F., &Hurbissoon, R. (2011). Green buildings: A Mauritian built environment stakeholders' perspective. *Acta Structilia, 18*(1), 81-101.

Cardoso, N. B., & Machado, E. C. (2017). Sustainable and green libraries in Brazil. Transinformacao. Retrieved February 28, 2021, from https://doi.org/10.1590/2318-08892017000200002

Cassardo, C. (2014). Global warming and water sustainability. In E3S Web of Conferences (Vol. 2, p. 02006). EDP Sciences.

Chambers, J. M. (2019). Social Science Theory for Environmental Sustainability: a Practical Guide by Marc J. Stern (2018), Oxford University Press, Oxford, UK.

Cheng, C. L., Peng Jr, J., Ho, M. C., Liao, W. J., & Chern, S. J. (2016). Evaluation of water efficiency in green building in Taiwan. *Water, 8*(6), 1-11.

Chowdhury G. G. (2014a). OA Policies and the Sustainability of Digital Libraries of Scholarly Information. In: Tuamsuk K., Jatowt A., Rasmussen E. (eds) The Emergence of Digital Libraries – Research and Practices. ICADL 2014. Lecture Notes in Computer Science, vol 8839. Springer, Cham.

Chowdhury G.G. (2013) Sustainability of Digital Libraries: A Conceptual Model. In: Aalberg T., Papatheodorou C., Dobreva M., Tsakonas G., Farrugia C.J. (eds)

Research and Advanced Technology for Digital Libraries. TPDL 2013. Lecture Notes in Computer Science, vol 8092. Springer, Berlin, Heidelberg

Chowdhury, G. (2012). Building environmentally sustainable information services: A green IS research agenda, *Journal of the American Society for Information Science and Technology, 63*(4), 633-647.

Chowdhury, G. (2014). Sustainability of digital libraries: a conceptual model and a research framework. *International Journal on Digital Libraries, 14*(3/4), 181–195.

Chowdhury, G. G. (2016). How to improve the sustainability of digital libraries and information Services? *Journal of the Association for Information Science and Technology, 67*(10), 2379-2391.

Chowdhury, M. (2016). Emphasizing morals, values, ethics, and character education in science education and science teaching. *MOJES: Malaysian Online Journal of Educational Sciences, 4*(2), 1-16.

Cobbinah, P. B., Asibey, M. O., Opoku-Gyamfi, M., & Peprah, C. (2019). Urban planning and climate change in Ghana. *Journal of Urban Management, 8*(2), 261-271.

Connell, V. (2010). Greening the library: Collection development decisions. Endnotes: *The Journal of the New Members Round Table, 1*(1), 1-15.

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approach*. Sage publications.

Creswell, J. W., & Poth, C. N. (2013). *Qualitative inquiry and research design: Choosing among five approaches*. Sage publications.

Dalbehera, S. (2015). Greening the libraries for sustainable development: a case study of Technical University libraries in Odisha. Paper presented at 60th ILA International Conference on Embedded Librarianship and Technological Challenges of the Digital Age, 2015.

Darko, A., ChuenChana, A. P., Yanga, Y., Shan, M., Hec, B., & Goud, Z. (2018). Influences of barriers, drivers, and promotion strategies on green building technologies adoption in developing countries: The Ghanaian case. *Journal of Cleaner Production, 200*(1), 687-703.

Datta, S. (2015). Green is the new black: bringing the libraries into the green scene. *International Journal of Digital Library Services, 5*(3), 59-68.

Dearing, J. W. (2009). Applying diffusion of innovation theory to intervention development. *Research on social work practice, 19*(5), 503-518.

Dias, S. M. (2017). Environmental sustainability for public libraries in Portugal: A first approach. *Electronic Green Journal, 1*(40)1-16.

Driessen, P. H., & Hillebrand, B. (2002). Adoption and diffusion of green innovations. *Marketing for sustainability: towards transactional policy-making*, 343-355.

Esmaeiliana, B., Wang B., Lewis, K., Duarteef, F., Rattif, C., & Behdad, S. (2018). The future of waste management in smart and sustainable cities: A review and concept paper. *Waste Management, 81*(2), 177-195.

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American journal of theoretical and applied statistics, 5*(1), 1-4.

Fang, WT., Hassan, A., LePage, B.A. (2023). Environmental Literacy. In: *The Living Environmental Education*. Sustainable Development Goals Series. Springer, Singapore. https://doi.org/10.1007/978-981-19-4234-1_4

Fedorowicz-Kruszewska, M. (2020). Environmental education in libraries – theoretical foundations and practical implementation. *Library Management, 41*(5), 279-293.

Fedorowicz-Kruszewska, M. (2020b). Green libraries and green librarianship–Towards conceptualization. *Journal of Librarianship and Information Science*, *53*(4), 645-654.

Feng, L. Hu, J., & Zhang, Y. (2019). The Path and Method of Guiding College Students' Information Literacy Behavior in the Era of Network New Media. Paper presented at 3rd International Conference on Economics, Management Engineering and Education Technology (ICEMEET 2019).

Fraser, J., Fahlman, D. W., Arscott, J., & Guillot, I. (2018). Pilot testing for feasibility in a study of student retention and attrition in online undergraduate programs. The International Review of Research in Open and Distributed Learning, 19(1),260-278.

Fresnido, A. M. B., & Esposo-Betan, S. M. S. (2017). Going green: Sustainable practices in Philippine libraries. IFLA | WLIC 2018.

Ghazali, E. M., Nguyen, B., Mutum, D. S., & Yap, S. F. (2019). Pro-Environmental Behaviours and Value-Belief-Norm Theory: Assessing Unobserved Heterogeneity of Two Ethnic Groups. *Sustainability, 11*(12), 3237.

Given, L. M. (2008). The SAGE encyclopedia of qualitative research methods. SAGE Publications.

Hadi, M. A., & José Closs, S. (2016). Ensuring rigour and trustworthiness of qualitative research in clinical pharmacy. *International journal of clinical pharmacy*, *38*(3), 641-646.

Hasan, M. S., & Zhang, R. J. (2016). Critical barriers and challenges in implementation of green construction in China. *International Journal of Current Engineering and Technology*, *6*(2), 435-445.

Hashempour, L. (2018, May). Effect and Importance of Lighting Systems in School Libraries. In *IASL Annual Conference Proceedings*.

Hauke, P., & Werner, K. U. (2012). The second-hand library building. Sustainable thinking through recycling old buildings into new libraries. *IFLA Journal, 1*(2012),60–67.

Hauke, P., & Werner, K. U. (2013). Going green as a marketing tool for libraries: environmentally sustainable management practices.

Hauke, P., Charney, M., & Sahavirta, H. (Eds.). (2018). *Going Green: Implementing Sustainable Strategies in Libraries Around the World: Buildings, Management, Programmes and Services* (Vol. 177). Walter de Gruyter GmbH & Co KG.

Hauke, P., Grunwald, M., & Wilde, A. (2014). Green Libraries Coming Up! National and international initiatives fostering environmentally sustainable libraries and library services. *BOBCATSSS 2014 Proceedings, 1*(1), 65-72.

Hauke, P., Werner, K. U. & Latimer, K. (eds.) (2013). The Green Library = Die grüne Bibliothek. Munich: De Gruyter Saur (IFLA Publications, 161).

Heale, R., & Forbes, D. (2013). Understanding triangulation in research. *Evidence-based nursing, 16*(4), 98-98.

Horvath, B., Mallinguh, E., & Fogarassy, C. (2018). Designing Business Solutions for Plastic Waste Management to Enhance Circular Transitions in Kenya. *Sustainability, 10*(5), 1-18.

Hossain, M. M., Hecimovic, A. & Choudhury, A. A. K. (2015). Corporate Social and Environmental Responsibility Reporting Practices from an Emerging Mobile Telecommunications Market. *Australian Accounting Review, 25*(4), 389-404.

Hung, C. M., & Hoi, L. T. (2010). Maximizing the benefits of the use of rubrics to promote assessment for learning in inquiry study. *Educational Practice and Theory, 32*(2), 5-21.

Hussain, A., & Ahmad, P. (2021). Adoption of smart technologies in university libraries of Pakistan: a qualitative review. *Library Philosophy and Practice*, *2021* (6055),1-10.

Hwang, B., Zhu, L., Wang, Y., & Cheong, X. (2017). Green Building Construction Projects in Singapore: Cost Premiums and Cost Performance. *Project Management Journal, 48*(4), 67-79.

Janeþková, P. (2003). Objectivism versus subjectivism in the process of the interpretation of the contract. *Oxford Journal of Legal Studies, 23*(2), 176.

Jankowska, M. A. (2014). Practicing sustainable environmental solutions: A call for green policy in academic libraries. *Against the Grain, 22*(6), 12.

Joachim, O. I., Kamarudin, N., Aliagha, G. U., & Ufere, K. J. (2015). Theoretical explanations of environmental motivations and expectations of clients on green

building demand and investment. In IOP Conference Series: Earth and Environmental Science (Vol. 23, No. 1, p. 012010). IOP Publishing.

Karioja, E. (2009). How to evaluate libraries' sustainability? An approach to an evaluation model and indicators. *Journal of the ICRU, 9*(2).

Karioja, E. (2013). Sustainability in libraries: a comparative study of ecological sustainability. In *IFLA World Library and Information Conference*.

Karioja, E., & Niemitalo, J. (2013). The green library: The challenge of environmental sustainability. In *IFLA World Library and Information Conference*.

Kavuri-Mutuku, P. (2018). Chapter 7: Action to Combat Climate Change and its Impact. In, Hauke, P., Charney, M., & Sahavirta, H. (eds.). *Going Green: Implementing Sustainable Strategies in Libraries around the World*, pp. 86-93. IFLA Publications

Kawulich, B. (2012). Collecting data through observation. *Doing social research: A global context*, *6*(12), 150-160.

Khallar, L. (2015). Redesigning Libraries to Handle the Environmental Challenges of the Future: Green Libraries. In 60th ILA International Conference on Embedded Librarianship and Technological Challenges of the Digital Age, 2015.

Killam, L. (2013). Research terminology simplified: Paradigms, axiology, ontology, epistemology and methodology. Laura Killam.

Kim, J. J., & Hwang, J. (2020). Merging the norm activation model and the theory of planned behavior in the context of drone food delivery services: Does the level of product knowledge really matter? *Journal of Hospitality and Tourism Management*, *42*, 1-11. https://doi.org/10.1016/j.jhtm.2019.11.002

Kim, J. L., Greene, M., & Kim, S. (2014). Cost comparative analysis of a new green building code for residential project development. *Journal of construction engineering and management*, *140*(5), 05014002.

Kiplagat, S., Odero, D., & Buigutt, S. (2017). E-Waste Management at Egerton University Library, Njoro Campus, Kenya. *International Journal of Innovative Research & Development*, *6*(7), 232-240.

Kodnikar, A., Hajare, S., Thorat, S., & Bokil, S. (2018). Innovations in Transforming a Traditional Building into Green Building. *International Journal of Engineering Research in Mechanical and Civil Engineering (IJERMCE) Special Issue (2018*), 13-18.

Korstjens, I., & Moser, A. (2018). Series: Practical guidance to qualitative research. Part 4: Trustworthiness and publishing. *European Journal of General Practice*, *24*(1), 120-124.

Kumar, S., & Sofiya, A. (2019). Application of green concepts in the libraries of Thiruvananthapuram: an investigation. *Library Philosophy and Practice (e-journal)*, 2976.

Kurbanoğlu, S., & Boustany, J. (2014, October). From green libraries to green information literacy. In *European Conference on Information Literacy* (pp. 47-58). Springer, Cham.

Kutt, K. (2018). 8 The BookboXX. *Going Green: Implementing Sustainable Strategies in Libraries Around the World: Buildings, Management, Programmes and Services*, 2018(177), 94-102.

Laberge, Y. (2015). Theories of Sustainable Development. Electronic Green Journal, 1(38), 1. Retrieved May 12, 2021, from https://icipe.idm.oclc.org/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=f5h&AN=103269249&site=eds-live&scope=site

Lai, C., & Lin, S. (2017) Systems theory. In Scott, C.R., & Lewis, L. (eds.). *The International Encyclopedia of Organizational Communication*. John Wiley & Sons, Inc.

Lam, P. T. I., Chan, E. H. W., Chau, C. K., Poon, C. S., & Chun, K. P. (2011). Environmental management system vs green specifications: how do they complement each other in the construction industry? *Journal of Environmental Management, 2011*(92), 788-795.

Lam, P. T., Chan, E. H., Poon, C., Chau, C., & Chun, K. (2010). Factors affecting the implementation of green specifications in construction. *Journal of Environmental Management, 91*(3), 654-661.

Leedy, P. D. & Ormrod, J. E. (2010). Practical Research: Planning and Design (9th ed.). Boston, MA: Pearson.

Lockwood, C. (2006). Building the Green Way. *Harvard Business Review, 84*(6), 129.

Lu, J. W., Chang, N. B., Zhu, F., Hai, J., & Liao, L. (2018, March). Smart and green urban solid waste collection system for differentiated collection with integrated sensor networks. In *2018 IEEE 15th international conference on networking, sensing and control (ICNSC)* (pp. 1-5). IEEE.

Malpas, C., & Proffitt, M. (2017). *The Transformation of Academic Library Collecting: A Synthesis of the Harvard Library's Hazen Memorial Symposium*. Dublin, OH: OCLC Research. https://doi.org/10.25333/C3J04Z.

Massardier-Pilonchery, A., Nerrière, E., Croidieu, S., Ndagijimana, F., Gaudaire, F., Martinsons, C., Noé, N., & Hours, M. (2019). Assessment of Personal Occupational Exposure to Radiofrequency Electromagnetic Fields in Libraries and Media Libraries, Using Calibrated On-Body Exposimeters. *International Journal of Environmental Research and Public Health, 16*(12), 2087.

Mavily, P., & Vasudevan, T. M. (2019). *Going green: Libraries for sustainable development*. Conference: National conference on Innovations and Transformations in Libraries (NCITL 2019)

Mayburg, C., & Poggempoel, M. (2007). Qualitative methods: a research approach worth considering. *African Journal of Psychiatry, 10*(2), 65-67.

Mc Manus, P., Mulhall, S., Ragab, M., & Arisha, A. (2017, June). An investigation in the methodological approaches used in doctoral business research in Ireland. In *ECRM 2017 16th European Conference on Research Methods in Business and Management* (p. 233). Academic Conferences and publishing limited.

McBane, M., S., & Himmel, N. A. (2010). How Green Is My Library? Retrieved March 11, 2021, from https://icipe.idm.oclc.org/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edsebk&AN=319103&site=eds-live&scope=site

McElrath, E., & Sutherland, S. (2015). Environmental Sustainability and Libraries. *International Journal of Humanities and Social Science, 5*(12), 13-23.

Meher, P., & Parabhoi, L. (2017). Green library: an overview, issues with special reference to Indian libraries. *International Journal of Digital Library Services, 7*(2), 62-69.

Mehta, S. (2018). Green Libraries. *Knowledge Librarian, 3*(2), 235-240.

Miller, K. (2010). Public Libraries Going Green. Retrieved April 18, 2021, from https://icipe.idm.oclc.org/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=308792&site=eds-live&scope=site

Mills, A. J., Durepos, G., & Wiebe, E. (2010). Descriptive case study. In Encyclopedia of case study research (pp. 289-289). SAGE Publications, Inc., https://dx.doi.org/10.4135/9781412957397.n108

Moura, D. S. (2017). Environmental Sustainability for Public Libraries in Portugal: a first approach. *Electronic Green Journal, 3*(40), 277-289.

Muigua, K., & Musyimi, P. (2010). *Enhancing environmental democracy in Kenya*. Kariuki Muigua & Company Advocates

Mulford, S. M., & Himmel, N. A. (2010). How green is my library? ABC-CLIO.

Mulwa, F., Li, Z., & Fangninou, F. F. (2021). Water scarcity in Kenya: current status, challenges and future solutions. *Open Access Library Journal, 8*(1), 1-15.

Mwanzu, A. (2018). 18 Going Green to Embrace Aesthetic Reflections and Sustainable Library Buildings. *Going Green: Implementing Sustainable Strategies in Libraries Around the World: Buildings, Management, Programmes and Services*, *177*, 210.

Mwanzu, A. (2022). Green Initiatives Towards a Sustainable Future: Insights from Libraries in Kenya. *International Federation of Library Associations and Institutions (IFLA), 2022*(87), 1-18.

NASA. (2022, January 13). *2021 Tied for 6th Warmest Year in Continued Trend, NASA Analysis Shows* [Release 22-006]. https://www.nasa.gov/press-release/2021-tied-for-6th-warmest-year-in-continued-trend-nasa-analysis-shows

Nassaji, H. (2015). Qualitative and descriptive research: Data type versus data analysis. *Language teaching research, 19*(2), 129-132.

Nduka, D. O., & Ogunsanmi, O. E. (2015). Stakeholders perception of factors determining the adoptability of green building practices in construction projects in Nigeria. *Journal of Environment and Earth Science, 5*(2), 188-196.

Niegaard, H. (2013). "Environmental awareness is on the rise": Sustainability in Danish public libraries. In P. Hauke, K. Latimer & K. Werner (Ed.), *The Green Library - Die grüne Bibliothek: The challenge of environmental sustainability - Ökologische Nachhaltigkeit in der Praxis* (pp. 279-294). Berlin, Boston: De Gruyter Saur. https://doi.org/10.1515/9783110309720.279

Niig, L. N. (2016). The Challenges in Implementing the Green Building Concept – A Study among Contractors in Sibu, Sarawak. (Malaysia) (Unpublished doctoral dissertation). Liverpool John Moores University, Sarawak, Malaysia.

Noble, H., & Smith, J. (2015). Issues of validity and reliability in qualitative research. *Evidence-Based Nursing, 18*(2), 34-5. https://doi.org/10.1136/eb-2015-102054

Ogola, S. (2018). USIU-AFRICA – Garden in The Library. Nairobi, Kenya: USIU-Africa.

Okpidi-Urhibo, E. (2023) Green library initiative in Nigeria: Insights and le e in Nigeria: Insights and levels of implementation in academic libraries. *Library Philosophy and Practice (e-journal), 7802*. https://digitalcommons.unl.edu/libphilprac/7802

Olawumi, T. O., & Chan, D. W. (2019). Critical success factors for implementing building information modeling and sustainability practices in construction projects: A Delphi survey. *Sustainable Development, 27*(4), 587-602.

Olhoff, A. & Christensen, J. M. (2019). Emissions gap report 2019. *United Nations Environment Programme (UNEP): Gigiri Nairobi, Kenya*.

Orum, A. M. (2001). Case Study: Logic. In International encyclopedia of the social & behavioral sciences (pp. 1509-1513).

Osanloo, A., & Grant, C. (2016). Understanding, selecting, and integrating a theoretical framework in dissertation research: Creating the blueprint for your "house". *Administrative issues journal: connecting education, practice, and research*, *4*(2), 7.

Oyelude, A. A., & Alabi, A. O. (2013). *Greening: Pluses and minuses of Nigerian libraries in promoting environmental sustainability*. Conference: IFLA World Library and Information Congress: Singapore

Pangail, R. K. (2015). Green libraries: meaning, standards and practices. Episteme, 4(3),1-9.

Pham, L. T. M. (2018). Qualitative Approach to Research A Review of Advantages and Disadvantages of Three Paradigms: Positivism, Interpretivism and Critical Inquiry. University of Adelaide.

Prasanth, M., & Vasudevan, T. M. (2019, January). Going Green: Libraries for Sustainable Development. Paper presented at National conference on Innovations and Transformations in Libraries (NCITL 2019).

Priti, S., & Rajani, M. (2021). Environmental Literacy through Go Green in Academic Libraries. *A Journal of Library and Information Science, 15*(4), 237-247.

Purohit, S. (2017). Green Library- A New Concept of Library. Retrieved June 17, 2021, from http://www.mugeakbulut.com/bby721/wp-content/uploads/2017/03/21-09-2013-Prohit.pdf

Rabidas, S. (2016). Green Library Buildings: A Sustainable Process. *International Journal of Advance Research and Innovative Ideas in Education, 2*(6), 342-346.

Rehman, A. A., & Alharthi, K. (2016). An introduction to research paradigms. *International Journal of Educational Investigations, 3*(8), 51-59.

Rickert, K. (2019). "Greening" our college libraries: Complete the cycle of the three Rs. *College & Research Libraries News, 62*(8), 825-829.

Robinson, L. (2009). A summary of diffusion of innovations. Enabling change, 5(10).

Robson, C. (2002). Real world research: A resource for social scientists and practitioner-researchers (Vol. 2). Oxford: Blackwell.

Rogers, E., M. (2003). Diffusion of innovations. 5th Ed. New York: Free Press.

Rohlf, R. H. (1986). Architecture: Library Design: What Not to Do. *American Libraries, 17*(2), 100–104.

Romero-Hernández, O., & Romero, S. (2018). Maximizing the value of waste: From waste management to the circular economy. *Thunderbird International Business Review, 27*(2), 277-289.

Saeed, B. B., Afsar, B., Hafeez, S., Khan, I., Tahir, M., & Afridi, M. (2018). Promoting employee's proenvironmental behavior through green human resource management practices. *Corporate Social Responsibility and Environmental Management, 26*(2), 313-328.

Saha, P., & Padhan, H. (2019). Green Libraries Effect to the Academic Institutions: A Special Study on US Based Libraries. *Library Philosophy and Practice, 1*(1), 1-9.

Saunders, M., Lewis, P., & Thornhill, A. (2007). Research methods for business studies. Second Impression, Dorling Kindersley (India) Pvt Ltd.

Savari, M., Damaneh, H. E., Damaneh, H. E., & Cotton, M. (2023). Integrating the norm activation model and theory of planned behaviour to investigate farmer pro-environmental behavioural intention. *Scientific Reports, 13*(1), 5584.

Scherer, J. A. (2014) Green libraries promoting sustainable communities. Paper presented at: IFLA WLIC 2014 - Lyon - Libraries, Citizens, Societies: Confluence for

Knowledge in Session 152 - Environmental Sustainability and Libraries Special Interest Group. In: IFLA WLIC 2014, 16-22 August 2014, Lyon, France.

Schwartz, S. H. (1977). Normative influences on altruism. *Advances in Experimental Social Psychology*, *10*(C), 221–279.

Schwartz-Shea, P., & Yanow, D. (2020). Interpretivism. In P. Atkinson, S. Delamont, A. Cernat, J.W. Sakshaug, & R.A. Williams (Eds.), SAGE Research Methods Foundations. https://www.doi.org/10.4135/9781526421036915455

Shah, L., Kumar, S., & Shah, M. K. (2015). Green Libraries in Academic Institutions: Need of the Hour. *Social Issues and Environmental Problems Journal of Research, 39035*(2008), 1–5.

Shi, Q., Zuo, J., Huang, R., Huang, J., & Pullen, S. (2013). Identifying the critical factors for green construction – An empirical study in China. *Habitat International, 2013*(40), 1–8.

Singh, M. P., & Dixit, S. (2021). Sustainable Strategies towards Green Libraries: A Study of State University Libraries of Lucknow, Uttar Pradesh. *Library Philosophy and Practice, 1*(4), 1-20.

Singh, P., & Mishra, R. (2019). Environmental Sustainability in libraries through green practices/services. *Library Philosophy and Practice (e-journal), 3*(1), 411-436.

Singh, P., & Mishra, R. (2021). Environmentally Sustainable Approaches in Academic Libraries: A micro-study in Uttar Pradesh. Library Philosophy and Practice (e-journal), 2021(6110), 313-328.

Sonkkanen, L., Asikainen, M., & Saharavita, H. (2013). Ecological Sustainability of Libraries. IFLA Publications 161.

Srivastava, A., & Thomson, S. B. (2009). Framework analysis: a qualitative methodology for applied policy research. *Journal of Administration and Governance, 4*(2),*7279.*

Stark, M. (2012). Information in place: Integrating sustainability into information literacy instruction. *Electronic Green Journal, 1*(32), 1-16.

Stern, P. C. (2000). New Environmental Theories: Toward a Coherent Theory of Environmentally Significant Behavior. *Journal of Social Issues, 56*(3), 407–424.

Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human ecology review, 6*(2),81-97.

Stoss, F. (2010). Libraries Taking the'LEED': Green Libraries Leading in Energy and Environmental Design. *Online (Weston, CT), 34*(2), 20-27.

Suhamad, D. A., & Martana, S. P. (2020, July). Sustainable Building Materials. In *IOP Conference Series: Materials Science and Engineering* (Vol. 879, No. 1, p. 012146). IOP Publishing.

Tella, A., Adedoyin, O. O., & Oso, O. (2019). Comparative analysis of card and online public access catalogue (OPAC) preferences among students in selected Nigerian universities. *Journal of Library Services and Technologies, 1*(1), 57-72.

Thrishala W. (2019). (2019, October). The impact of Green Information Literacy of library staff to establish green library movements in the library, Sri Lanka Institute of Development Administration (SLIDA). [Paper presentation]. 3rd National Library Research Symposium, National Library and Documentation Services Board, Sri Lanka, (3).

Tomaszewski, L. E., Zarestky, J., & Gonzalez, E. (2020). Planning qualitative research: Design and decision making for new researchers. *International Journal of Qualitative Methods, 19*, 1609406920967174.

Tong, S., & Ebi, K. (2019). Preventing and mitigating health risks of climate change. Environmental Research. *Environmental research, 174(*2019*),* 9–13. https://doi.org/10.1016/j.envres.2019.04.012

Townsend, A. K. (2014). Environmental sustainability and libraries: facilitating user awareness. *Library Hi Tech News, 31*(9), 21–23.

Uhl, C., & Anderson, A. (2001). Green destiny: Universities leading the way to a sustainable future. *BioScience, 51*(1), 36-42.

UNEP. (2020, December 9). Facts about the climate emergency. UNEP - UN Environment Programme. Retrieved February 28, 2021, from https://www.unep.org/explore-topics/climate-change/facts-about-climate-emergency

UN-Water. (2019). Climate Change and Water(UN-Water Policy Brief September, 2019). Retrieved from https://www.unwater.org/app/uploads/2019/10/UN_Water_PolicyBrief_ClimateChange_Water.pdf

Wakhungu, J. (2021). *Adoption of Green Building Concepts in Residential Developments in Nairobi City County* (Doctoral dissertation, University of Nairobi).

Walsh, Bryan. (2007, October 12). A green tipping point. TIME.com. Retrieved February 28, 2021, from http://www.time.com/time/world/article/0,8599,1670871,00.html

Wedawatta, G. S. D., Ingirige, M. J. B., & Amaratunga, R. D. G. (2011). Case study as a research strategy: Investigating extreme weather resilience of construction SMEs in the UK. Paper presented at the ARCOM Doctoral Workshop, International Conference on Disaster Resilience - 7th Annual International Conference of International Institute for Infrastructure, Renewal and Reconstruction. Kandalama, Sri Lanka.

Weerasinghe, A. S., & Ramachandra, T. (2018). Economic sustainability of green buildings: a comparative analysis of green vs non-green. *Built Environment Project and Asset Management , 8*(5), 528-543.

Wei Hu, X. L. (2019). Attention and sentiment of Chinese public toward green buildings based on Sina Weibo. *Sustainable Cities and Society, 44*(1), 550-558.

Wilkinson, L.A. (2011). Systems Theory. In: Goldstein, S., Naglieri, J.A. (eds) Encyclopedia of Child Behavior and Development. Springer, Boston, MA. https://doi.org/10.1007/978-0-387-79061-9_941

Williamson, K., Wright, S., Burstein, F., & Schauder, D. (2003). Adoption of online databases in public libraries: An Australian case study. *LIBRES: Library and Information Science Research International Journal, 13*(2), 1-8.

Winchester, C. L., Salji, M. J., & Kasivisvanathan, V. (2017). Gathering preliminary data. *Journal of Clinical Urology, 10*(6), 568-572.

Wong, P. (2021). *Sustainability as a Core Value of Librarianship*. https://libguides.ala.org/SustainableLibraries#:~:text=%22To%20thrive%20and%20evolve%20into,feasible%2C%20and%20socially%20equitable.%22

Younghee, N., & In-Ja, A. (2018). Evaluation Indicators for Green Libraries and Library Eco-friendliness. *International Journal of Knowledge Content Development & Technology, 8*(1), 51-77.

Zhang, X., Plattern, A., & Shen, L. (2011). Green Property Development Practice in China: Costs and Barriers. *Building and Environment, 46*(2011),2153-2160.

Zhang, X., Shen, L., Wu, Y., & Qi, G. (2011). Barriers to implement green strategy in the process of developing real estate projects. *The Open Waste Management Journal, 4*(1), 33-37.

APPENDICES

APPENDIX A: INTERVIEW SCHEDULE

ASSESMENT OF ENVIRONMENTAL SUSTAINABILITY IN LIBRARIES IN KENYA

SECTION A: BASIC INFORMATION

a. Type of library
   Public Library [ ]
   Academic Library [ ]
   Special Library [ ]
   School Library [ ]

b. Job Position ……..
c. Department ……..
d. Years of service in the position ……..
e. Age …….
f. Highest academic level achieved:…….
g. Nationality:……
h. Gender:…….

SECTION B

1. Comprehension and perception of Kenyan librarians towards the concept of greening libraries for environmental sustainability

i. Would you consider your library as a green library? Explain your answer.

ii. What aspects of your library have been implemented in consideration of the green movement?

iii. How do you consider your library to have implemented the green concept?

   a. Fully [ ]
   b. Partially [ ]
   c. Not at all [ ]

   Explain your answer

iv. As a library, are there services that can be consider under green services? What are some of these services?

v. How is your library contributing to eco-friendly/environmental sustainability with respect to:
   a. Re-using and recycling of materials
   b. Reducing waste and toxic products
   c. Developing alternative technologies.

vi. How has your library been designedto reduces energy and water use and maximizes the use of natural and renewable resources?

vii. What are some of the measure taken in your library to improve air conditions inside the library for better aeration?

2. Greening methods/ practices of environmental sustainability in the library

a. Do you understand what is environmental sustainability? Kindly explain your answer.
b. As a library are you concerned with environmental sustainability? Kindly explain your answer
c. What are some of the practices that are geared towards environmental sustainability in your library?
d. Below is a list of environment sustainability practices, among these practices, what are the most effective practices of environmental sustainability in the library? Explain your answer.
   i. Greening of site and surrounding area
   ii. Places for personal transport (bicycles)
   iii. Environmental impact on the immediate surroundings
   iv. Sustainability through compactness (‘fat buildings’)
   v. Economic exteriors / building skin, intelligent building design and zoning
   vi. The atrium as a typical feature of libraries
   vii. Using a pleasing sense of space to minimize space use
   viii. Minimizing the space consumption of building technology through intelligent arrangement

ix. Minimization of energy use through zoning of areas according to different requirements of each individual library function (with regard to climate control, lighting and acoustics)
x. Use of roof areas (green roofs and solar energy)
xi. Extensive resource saving compact storage (including use in public areas)
xii. Maintenance-friendly construction

e. Apart from these stated practices, is there any other environmental sustainability practice you would consider ideal for the library? Justify your answer.

3. Factors driving and impeding libraries' embracement and implementation of the green concept

a. Do you participate in any green initiatives as a library? Why do you participate or why do you not participate?
b. As a library what factors have driven you to embrace the green concept?
c. As a library what challenges do you encounter in implementing the green concept? Please explain
d. What solution would you provide for the above challenges?

4. Strategies that guide libraries in transforming to 'green libraries'

a. How has your library taken a strategic direction in transforming to a green library?
b. What are some of the strategies that your library uses in transforming to green library?
c. Would you consider these strategies effective in transforming your library to green library? Please explain
d. What renovation have been done in your library to realign it to be environmentally friendly? Kindly state some of these renovations that have been done to make the library environment friendly

   What maintenance practices are carried out in your library that focus on transforming your library to become a green library?
e. Do you keep library lights on during the day? And do you use normal bulbs or eco-friendly light bulbs to reduce energy use? Please expound on this

f. With regards to library electronics what are some of the measure that have been taken to reduce electronic waste?
g. Does your library have or participate in any special events geared toward sustainable environment sensitization? What are some of these events?
h. How do you raise awareness on environment sustainability to your patrons and your surrounding community?
i. How have you exploited the world wide web(www) in implementing the green library concept in environment sustainability?
j. What are some of your networks/partners in environment sustainability initiatives and how have they helped your library in environment sustainability?
k. How is ICT helping your library in environmental conservation and sustainability?

APPENDIX B: OBSERVATION CHECKLIST

1. ENVIRONMENTAL MANAGEMENT AND SOCIAL ENGAGEMENT

Is the environmental work organized and made visible?

a) Does the library have an (official) environmental strategy or policy document?
b) Does the library have a clear plan (such as action plan) for environmental sustainability?
c) Does the library engage its society/users to environmental sustainability?
d) Does the library inform its society/users about its own environmental practices?
e) Does the library communicate its green positioning through its website?

2. GREEN LIBRARY BUILDING

Does the library fulfill the following LEED and other criteria?

a) Location or site selection: Is the library reachable by public transport or by walking?
b) Building materials: Are the materials such that they do contribute as little waste as possible, do not cause much damage to the natural environment, are recyclable and durable? Are the materials produced in a sustainable manner?
c) Water consumption and energy efficiency & consumption including lighting, heating and cooling
d) Green power and renewable energy
e) Indoor air quality and natural ventilation: necessary air ventilation
f) Use of daylight
g) Interior design: Is it durable and timeless, changeable? Are the materials sustainable?
h) Sustainable designed rooms for special collections etc. (Book stocks, archives)
i) Green roofs or gardens

3. RECYCLING AND SUSTAINABLE PRACTICES

Has the library taken care of basic recycling and recirculating?

a) Basic recycling: Paper, plastic, glass, cardboard, bio, metal
b) Separating waste and used ICT devices

c) Water and energy saving routines
d) Deleted books and other items

4. GREEN COLLECTIONS

Are collections and information on environmental issues consciously developed?

a) Does the library have a strategy to achieve information of environmental sustainability?
b) Does the library have an up-dated and relevant collection on environmental sustainability (in different formats)
c) Has the library arranged an easy access to environmental information? (Green corners etc.)

5. GREEN SERVICES

a) Does the library offer information retrieval on environmental sustainability?
b) Does the library offer education or assistance on environmental information retrieval?
c) Does the library offer working spaces and ICT devices for common use?
d) Does the library offer tools or other items for lend?
e) Does the library arrange events or lectures on environmental sustainability?
f) Does the library systematically run programs on teaching green information literacy?
g) Does the library guide, educate or encourage children on environmental sustainability?
h) Does the library give citizens an opportunity to arrange environmental events or represent their environmental projects?

6. SUSTAINABLE PROJECTS

a) Does the library have special projects on environmental sustainability? Which?
b) Does the library cooperate with partners in terms of achieving sustainability goals? (SDG 17)
c) Does the library measure its sustainability impact in any way?

7. GENERAL

a) Greening of site and surrounding area
b) Places for personal transport (bicycles)
c) Environmental impact on the immediate surroundings
d) Sustainability through compactness (‘fat buildings’)
e) Economic exteriors / building skin, intelligent building design and zoning
f) The atrium as a typical feature of libraries
g) Using a pleasing sense of space to minimize space use
h) Minimizing the space consumption of building technology through intelligentarrangement
i) Minimization of energy use through zoning of areas according to different requirements ofeach individual library function (with regard to climate control, lighting and acoustics)
j) Use of roof areas (green roofs and solar energy)
k) Extensive resource saving compact storage (including use in public areas)
l) Maintenance-friendly construction

APPENDIX C: DOCUMENT REVIEW CHECKLIST

1) Type of document
2) Author/creator of the document
3) Context (place and time of the document's creation)
4) Intended audience
5) Purpose for the document's creation
6) Type of document (photograph, pamphlet, government-issued document, newspaper article, diary entry, etc.)
7) Main points expressed in the document
8) General message of the document (What is it trying to say? What perspective does it represent?)
9) Significance (So what? Why is this document important?)

APPENDIX D: DECLARATION OF CONSENT

ADOPTION OF GREEN INITIATIVES BY LIBRARIES IN KENYA FOR ENVIRONMENTAL SUSTAINABILITY

Participant Declaration of Consent

I……**Arnold Mwanzu**…… (Full names of participant) hereby confirm that I have read and understood the nature of this research project, and I consent to participate in the research. I understand that my participation is voluntary and that I am free to withdraw from the project at any time, if I so wish.

SIGNATURE OF PARTICIPANT & DATE

Sign  Date 24th August 2021

Student's Contacts:
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APPENDIX E: INFORMED CONSENT FOR AUDIO & PHOTOGRAPHIC RECORDING

ADOPTION OF GREEN INITIATIVES BY LIBRARIES IN KENYA FOR ENVIRONMENTAL SUSTAINABILITY

Declaration of Consent for Audio and Photographic Recording

Dear Participant,

AUDIO AND PHOTOGRAPHIC RECORDING

My name is Arnold Mwanzu. I am a PhD candidate at Moi University, School of Information Sciences. I am currently carrying out a study on green initiatives in libraries in Kenya. You have been selected as one of the key persons in the study. I kindly request your participation and I would like you to note that:

- The information you provide will be treated with utmost confidentiality and will not be attributed to you in person, but reported generally as a respondent opinion.
- Any information given by you, will be used for purposes of this research only, whose focus is academic with no financial benefits.
- Care will be taken to store data in a secure manner and to destroy it after 5 years.
- Your participation in the research is out of your free will. You will not be penalized for not participating or for discontinuing your participation.
- The interview may last about 30 minutes.
- If you are willing to be interviewed, please indicate (by ticking as applicable) whether the interview can be recorded by the following equipment:

	Willing	Not Willing
Audio Recording Device		
Photography Device		

Student's Contacts:
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APPENDIX F: DEBRIEF FORM

ADOPTION OF GREEN INITIATIVES BY LIBRARIES IN KENYA FOR ENVIRONMENTAL SUSTAINABILITY

Debrief Form

Thank you for taking the time to participate in this research study. The study aims to explore the adoption of green library concepts in Kenya for environmental sustainability with a view to proposing strategies that can be used to guide libraries in the going green transformation.

Furthermore, the reviewed literature and the study findings will go a long way in filling the current gap in the empirical literature on the phenomenon of green and sustainable library concepts in Kenya. Future studies in the area could use the research as a baseline resource.

Once again, thank you for your participation.

Sincerely,

Arnold Mwanzu

PhD student and researcher,

Moi University.

APPENDIX G: WORK PLAN

Activities	Months (2021/2022)											
	Jan	Feb	Mar	Apr	May- Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
Proposal writing												
Proposal Presentation												
Revision and approvals												
Data Collection												
Data analysis												
Writing, submission of thesis												
Thesis defence												

APPENDIX H: NACOSTI Approval

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **388708**

Date of Issue: **11/November/2021**

RESEARCH LICENSE

This is to Certify that Mr.. Arnold Mmbwanga Mwanzu of Moi University, has been licensed to conduct research in Kajiado, Kiambu, Nairobi, Nakuru, Uasin-Gishu on the topic: Adoption of green initiatives by libraries in Kenya for environmental sustainability for the period ending : 11/November/2022.

License No: **NACOSTI/P/21/14068**

388708

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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APPENDIX I: ETHICS RESEARCH BOARD APPROVAL

United States International University-Africa

REF: USIU-A/IRB/359-2021

18th October, 2021

TO: ARNOLD MWANZU

Dear Sir/madam

RE: ADOPTION OF GREEN INITIATIVES BY LIBRARIES IN KENYA FOR ENVIRONMENTAL SUSTAINABILITY

This is to inform you that ***IRB*** has reviewed and approved your above research proposal. Your application approval number is **USIU-A/IRB/359-2021.** The approval period is ***18th October 2021 – 18th October 2022***

This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***IRB***.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***IRB*** within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***IRB*** within 72 hour
v. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vi. Submission of an executive summary report within 90 days upon completion of the study to ***IRB***

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://research-portal.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely

Juliana M. Namada, Ph.D.
Institutional Review Board (IRB) Chair
Email: irb@usiu.ac.ke

APPENDIX J: GREEN LIBRARY CHECKLIST SWAHILI TRANSLATION

The Green Library Checklist, "Sustainable buildings, equipment, and management. A checklist" was originally published in German/English and translated to Swahili by Arnold Mwanzuin: The Green Library = Die grüneBibliothek. The challenge of environmental sustainability / ed. on behalf of IFLA by Petra Hauke, Karen Latimer and Klaus Ulrich Werner. München/Boston: De Gruyter Saur, 2013. VIII, 433 pp., ill. (IFLA Publications, 161) ISBN 978-3-11-030972-0. Available online, as open access/under an open access license

The checklist has been published on the IFLA website and translated by the researcher to Kiswahili as below:

Table 6.1: The Green Library Checklist

1.	**Mpango wa mradi, fedha**	**Project planning, finance**
	• Majadiliano ya mapema ya malengo ya kudumu kufanywa pamoja na mteja na kuanzishwa kwa vigezo • Mwelekeo juu ya ufafanuzi wa 'jengo la kijani': kiuchumi, mazingira ya kirafiki, uhifadhi wa rasilimali. Ngazi ya juu ya faraja kwa watumiaji, mazingira mazuri na ushirikiano bora katika jamii zao za kitamaduni kwa mfano mazingira ya Jirani • Uanzishaji wa malengo ya mazingira ya wafadhili au wateja	• Early discussion of sustainability goals with the client and the establishment of criteria • A sense of direction on the definition of a 'green building': economical, environmentally friendly, resource-saving. High level of comfort for users, a healthy environment with optimal integration into their socio-cultural i.e., neighborhood surroundings. • Establishment of the environmental goals of the sponsors or clients
	• Kuzingatia na kutia maanani usawa wa jengo kimazingira, ujenzi, operesheni, matengenezo, uharibifu na ovyo, usawa wa hewa Carbon Monoxide • Malengo ya hesabu ya gharama za uendeshaji • Uzingatio kamili wa Kurudi-juu-ya-Uwekezaji • Gharama za mzunguko wa maisha • Uumbaji wa orodha ya mahitaji ya ustawi na uendelevu • Kuzingatia kuongezeka kwa thamani ya mali (kupitia vyeti) • Kuzingatia msaada wa fedha unaopatikana	• Preliminary consideration of the ecological balance of a building, construction, operation, maintenance, demolition and disposal, CO2 balance • Targets for the calculation of operating costs • Comprehensive consideration of ROI (Return-on-Investment) • Life cycle costs • Creation of a list of sustainability desirables • Consideration of the increase in the value of the property (through certification) • Consideration of financial support available
2.	**Utoaji zabuni**	**Tendering**
	• Sekta ya umma inapaswa kuwa mfano kiigizo, haswa kwa kituo cha elimu na kitamaduni kama vile maktaba • Kuunda vigezo maalum vya uendelevu • Ufafanuzi wa vidokezo vya maktaba kimazingira • Taarifa ya malengo maalum ya kimazingira	• The public sector should be a role model, especially for an educational and cultural facility such as a library • Formulation of specific criteria for sustainability • Definition of the ecological footprint of the library

	• Mahitaji ya mtazamo kamili wa maswala ya uendelevu • Uhakikisho wa vyeti	• Statement of specific environmental objectives • Requirement for a holistic view of sustainability issues • Verification of certificates
3.	**Eneo la maktaba**	**Site / location**
	• Vigezo vya kiikolojia vinavyohusiana na mali na mazingira yake (urithi wa uharibifu, hali ya hewa, uzalishaji, kelele) • Matumizi ya rasilimali wakati wa ujenzi • Miundombinu (kuungana na usafiri wa umma) • Upatikanaji (pia gharama ya kibali cha tovuti na matengenezo) • Sehemu za usafiri binafsi (baiskeli) • Kupanda vijani kama maua/nyasi/miti kwenye eneo la maktaba na mazingira yake • Kuongeza dhana maalum za ujenzi na nishati	• Ecological criteria relating to the property and its surroundings (contamination legacy, climatic conditions, emissions, noise) • Resource use during construction • Infrastructure (connections to public transport) • Access (also costs for site clearance and maintenance) • Places for personal transport (bicycles) • Greening of the site and surrounding area • Optimisation of site-specific construction and energy concepts
4.	**Ujenzi**	**Construction**
	• Miundombingu: njia za kuingia na kutoka na kuhifadhi vitu. • Athari za kelele na kimazingira katika maeneo ya karibu • Uchaguzi wa wanakandarasi wa ujenzi na vifaa vya ujenzi kutoka eneo jirani • Kutoa zabuni za vifaa na taratibu za ujenzi: vigezo vya mahitaji ya uendelezaji na kuweka vyeti maanani	• Infrastructure: entranceways and exits, storage of materials • Noise and environmental impact on the immediate surroundings • Choice of building contractors and equipment from the surrounding region • Tendering for materials and processes: demand sustainability criteria and take certificates into account
5. 5.1	**Jengo** **Muundo**	**The building** **Structure**
	• Uendelezaji kupitia ukubwa ('majengo kubwa) • Nje kwa jengo kiuchumi / ngozi ya u-jenzi, majengo yaliyobuniwa kwa akili na ukandaji • Nafasi iliyo wazi kama kipengele cha kawaida cha maktaba • Kutumia hisia nzuri ya nafasi ili ku-punguza matumizi ya nafasi • Kupunguza matumizi ya nafasi ya te-knolojia ya ujenzi kupitia utaratibu wa akili • Upunguzaji wa matumizi ya nishati ku-pitia ukandaji wa maeneo kulingana na mahitaji mbalimbali ya kazi ya kila maktaba (kuhusiana na udhibiti wa hali ya hewa, mwangaza na vifaa vya sauti) • Matumizi ya maeneo ya paa (paa za kijani na nishati ya jua) • Uhifadhi mkubwa wa rasilimali za ku-hifadhi (pamoja na matumizi katika maeneo ya umma) • Ujenzi ulio na urahisi wa matengenezo	• Sustainability through compactness (‘fat buildings’) • Economic exteriors/building skin, intelligent building design and zoning • The atrium as a typical feature of libraries • Using a pleasing sense of space to minimise space use • Minimizing the space consumption of building technology through intelligent arrangement • Minimization of energy use through zoning of areas according to different requirements of each library function (with regard to climate control, lighting and acoustics) • Use of roof areas (green roofs and solar energy • Extensive resource-saving compact storage (including use in public areas) • Maintenance-friendly construction
5.2	**Muonekano wa Jengo**	**Facades**
	• Matumizi ya kudumu ya faade (kuota, nishati ya jua) • Vigezo vya nishati (uwekezaji wa joto)	• Sustainable use of the façade (greening, solar energy) • Energy criteria (thermal insulation)

	• Kubandika madirisha • Ulinzi wa miundo kutoka kwa jua kutumia madirisha ya ujuzi • Vipande vya kusagwa (daraja mbili)	• Window installation • Structural protection from sunlight using deep-lying windows
5.3	**Vifaa vya ujenzi**	**Building materials**
	• Ubora wa kikaboni wa vifaa • Vifaa na ujenzi unaofaa kwa afya njema (vifaa visivyo na madhara) • Tabia za matengenezo, huduma za ujenzi • Kudumu / Urefu • Kufadhiliwa au Kurekebishwa • Urahisi wa kuchakata na kusafisha • Idadi ya vifaa vya kusagwa zilizotumiwa, kwa mfano alumini, chuma	• Ecological quality of the materials • Materials and construction conducive to good health (non-hazardous materials) • Maintenance characteristics, building servicing • Durability / Longevity • Repairability • Ease of recycling and cleaning • Proportion of recycled material used, e. g. aluminium, steel
5.4	**Hali ya kujenga**	**Building climate**
	• Epuka matumizi makubwa ya mashini ya hewa (Kiyoyozi) • Tofauti ya dhana ya hali ya hewa kulingana na kazi ya maktaba • Matumizi ya saruji: joto la msingi la saruji • Uingizaji hewa wa asili • Ubora wa hewa ndani ya jengo: Magonjwa ya jeraha ya jengo: vifaa vya madhara na gesi • Matumizi tena ya hewa kutoka vyumba vya fotokopi / nakala na hali ya hewa • Dirisha yenye ubora wa glazing (insulation ya joto) • Mlango wa maktaba na hali ya hewa ya ndani ya jengo: milango inayozunguka, vestibules • Epuka baridi ya bandia • Kukinga jua • Maswala ya kimaumbile ya kukinga jua: madirisha ya chini	• Avoid major use of air-conditioning • Differentiation of the climate concept according to the library function • Use of concrete: core temperature of concrete • Natural ventilation • Interior air quality: Sick building syndrome: harmful materials and gases • Re-use of air from print/copy rooms and air conditioning • Window glazing quality (thermal insulation) • Library entrance and interior climate: revolving doors, vestibules • Avoid artificial humidification • Solar protection • Structural aspects of solar protection: low-lying windows
5.5	**Kawi, Mwangaza**	**Energy, light**
	• Mchana / mwangaza wa bandia • Nguvu: uwiano wa umeme kutoka vyanzo vya nishati mbadala • Joto yenye ufanisi wa kawi • Kuokoa umeme – kwa kutengeneza umeme (photovoltaics) • Fanya matumizi ya nishati/umeme kuonekana ili kupunguza kiwango cha matumizi: mita za nishati • Kuhifadhi Joto • Solar au geothermics • Wilaya inapokanzwa • Baridi: baridi usiku, thermal activation kwa miundo ya jengo • Vibadili vya joto • Uingizaji hewa: uingizaji hewa wa asili (Viyoyozi asili) • Kuleta Mwangaza asili kwenye jengo • Vifaa maalum kwa maambukizi ya mwanga • Udhibiti wa taa ufanisi (paneli za kudhibiti) • Mfumo wa taa na sensor ya harakati • Udhibiti wa mwangaza kibinafsi kwenye maeneo ya kusoma • Swichi za umeme , pia kwenye sehemu za kusoma/wasomaji • Nuru/Mwangaza kama inavyohitajika:	• Daylight / artificial light • Power supply: proportion of electricity from renewable energy sources • Energy-efficient heating • Electricity saving – electricity generation (photovoltaics) • Make energy use visible in order to reduce usage levels: energy meters • Heat recovery • Solar or geothermics • District heating • Cooling: night cooling, the thermal activation of building structures • Heat exchangers • Ventilation: natural ventilation • Bring natural light into the building • Translucent materials for light transmission • Efficient lighting controls (control panels) • Lighting system with movement sensors • Individual light control of reading places • Electric light switches, also for reader places • Light as needed: step switching, dimmer switches • Light source (energy-efficiency, life cycle costing, recycling) • Reduction of warm water use • Use of grey and rainwater (toilets, irrigation) • Water saving features (WCs, wash basin equipment)

	hatua ya kugeuza, swichi ili kutoa mwanga wa kipimo cha chini • Chanzo cha mwangaza (ufanisi wa nishati, gharama ya maisha, kurekebisha) • Upunguvu wa utumiaji maji moto • Matumizi ya maji ya kijivu na mvua (vyoo, umwagiliaji) • Makala ya kuokoa Maji (WCs, vifaa vya bafu)	
6.	**Kuweka inavyio faa ndani mwa jengo: chanzo, uimara, uwezo wa kusafisha, kuchakata**	**Interior fittings: source, durability, cleaning capabilities, recycling**
	• Sakafu ilivyomalizwa na mazulia • Acoustic baffles • Mbao: asili, jinsi gani, vyeti • Samani za Maktaba • Samani za ofisi • Usawa wa mazingira • Matumizi ya vifaa vinavyoweza kutengenezwa tena na vinavyoweza kutumika tena	• Floor finishes and carpets • Acoustic baffles • Wood: origin, how cultivated, certificates • Library furniture • Office furniture • Eco-balance • Use of renewable and reusable materials
7	**Teknolojia ya habari na teknolojia ya kijani (Green IT))**	**Green information and communication technology (Green IT)**
	• Matumizi ya umeme, uzalishaji, kuchakata • Mashini ndogo za kompyuta badala ya PCs (kuokoa umeme, muda mrefu wa maisha) • Usimamizi wa mbali • Vyeti vya vifaa: Nyota ya Nishati • Printers: matumizi ya umeme, utumizi wa wino • Soketi zinazotumiwa kwa PC na printa kuwa na uwezo wa kuwashwa/kuzimwa • Ufumbuzi wa Programu za kupunguza matumizi ya nishati (kusimama wkati hayatumiki) • Kupunguza matumizi ya karatasi, kuondolewa kwa karatasi ya mafuta	• Power consumption, production, recycling • Thin clients instead of PCs (power-saving, longer lifespan) • Remote management • Hardware certificates: Energy Star • Printers: power usage, use of ink • Switchable sockets for PCs and printers • Software solutions to optimize energy consumption (Stand-by) • Reduction in the use of paper, waiver for thermal paper
8.	**Huduma za watumizi wa maktaba**	**User services**
	• Huduma za Reprographic (skanning badala ya uchapishaji), ukubwa wa digital, uchapishaji mara mbili • Hot desking (dawati za habari zilizo na urahisi wa kutumika kama mahali pa kazi nje ya nyaraka za kupeana habari kwa wasomi) • Mbadala ya mifuko ya plastiki katika maktaba • Kahawa ya maktaba: China si plastiki, bidhaa za Fairtrade nk. • Kukodisha 'vifaa vingine' visivyo vya kitabu: vitu ambavyo havihitajiki kila	• Reprographic services (scanning instead of printing), the primacy of digital, double-sided printing • Hot desking (flexible information desks usable as workplaces outside of information desk times) • Alternatives to plastic bags in the library • Library café: not plastic, Fairtrade products etc. • Lending of 'other' non-book-materials: things not needed daily (from laptops to garden tools)
9. 9.1	**Uendelezaji wa maktaba** **Vyeti vya usimamizi wa mazingira (ISO 14000)**	**Library management** **Environmental management certificates (ISO 14000)**
	• Wafanyakazi waliohamasishwa na kushirikishwa • Kufuata kisheria • Kuendelea na Uboreshaji • W ajibu wa malengo endelevu • Uwazi wa gharama na matumizi	• Motivated and involved employees • Legal compliance • Continual improvement • Responsibility for sustainable goals • Transparency of cost and use • Competitive advantage

	• Faida ya ushindani	
9.2	**Usimamizi wa Kituo**	**Facility Management**
	• Kutenganisha taka na kuchakata • Makampuni ya kusafisha • Vifaa vya kusafisha: matumizi ya kiuchumi • Kusafisha ('Green Cleaning': sakafu, vituo vya usafi) • Kuepuka bidhaa za kemikali za kusafisha jengo • Matumizi ya bidhaa zisizo na sumu, za maji badala ya bidhaa za mafuta; ambavyo havina harufu ya marashi, haibadilishwa • Vifaa vya usafi (taulo, nk) • Usafishaji wa vyombo na ufungaji • Usafishaji wa betri, vifaa vya umeme na vipengele • Sauti wakati wa kusafisha - kusafisha kutumia vacuum kleaner • Matumizi ya bulb ya mwangaza nyepesi • Matumizi ya taa ya kusagwa/kutengenezwa tena kutoka kwa taa iliyotumika: Fluorescent na taa za kuokoa nishati, pia LED	• Waste separation and recycling • Cleaning firms • Cleaning materials: economic usage • Cleaning ('Green Cleaning': floors, sanitary facilities) • Avoidance of chemical products for cleaning the building • Use of non-toxic, water-based rather than oil-based products; perfume-free, biodegradable • Sanitary supplies (towels, etc.) • Recycling of containers and packaging • Recycling of batteries, electrical devices and components • Noise during cleaning routines –vacuum cleaning • Lightbulb use • Lightbulb recycling: fluorescent and energy-saving lamps, also LED
9.3	**Ofisi ya maktaba ya kijani**	**The green library office**
	• Ununuzi kijani (kuzingatia mazingira) • Kusafirisha kwa meli kuzingatia mazingira au swala la 'Green' • Matumizi ya watengenezaji vitabu wa mitaa (usawa wa hewa ya karbon monoxide) • Vitumizi vya ofisi na vifaa (asili, matumizi ya nishati, kuchakata) • wauzaji kutoka mitaa • Wauzaji waliyothibitishwa • Wafuzaji wa vitabu na kusambaza(usawa wa carbon monoxide, vifaa vya kufunga) • makao ya ya pamoja yawafanyikazi • Kupunguza matumizi ya karatasi • ifadhi ya kisasa • Vifaa vya ofisi ya kijani • Kupunguza taka na kutengana kwa taka (karatasi, plastiki, kioo, betri, vyombo vya habari vya hifadhi ya kisasa) • Kusaga makridi ya printer • Kuepuka bidhaa zilizo na sumu, hatari, au vigumu kubandika yaliyomo • joto ambayo inaweza kugeuzwa wakati watumizi hawapo • Jikoni ya wafanyakazi : vifaa vya umeme vinavyookoa nishati, ufanisi wa maji ya moto, bidhaa za fairtrade nk • Mafunzo yakujua kwa wafanyakazi	• Green procurement • Green shipping • Use of local bookbinders (CO2 balance re transport) • Office supplies and equipment (origin, energy consumption, recycling) • Local suppliers • Certified suppliers • Book suppliers and delivery (CO2 balance, packing materials) • Hot-desking • Reduction in use of paper • Digital archiving • Green office supplies • Waste reduction and separation of waste (paper, plastic, glass, batteries, digital storage media) • Recycling printer cartridges • Avoidance of products with poisonous, harmful, or difficult to recycle contents • Heating that can be turned down during periods of absence • Staff kitchens: energy-saving electrical appliances, energy-efficient hot water production, fairtrade products etc. • Awareness training for employees
10.	**Mikakati ya kimalengo**	**Strategic goals**
	• Uwazi wa gharama za nishati: uwazi hujenga akiba • Kudhibiti kwa kupunguza • Malengo yaliyokubaliana ya kuokoa nishati • Mipango yakuwatuza wafanyikazi bora • Kuathiri washirika wa biashara (wahubiri, wauzaji wa vitabu) • Kusisitiza lengo la kupata watumizi wapya • Ushirikiano wa kimikakati	• Transparency of energy costs: transparency creates savings • Controlling for reducing • Agreed targets for energy saving • Reward and incentive schemes • Influencing business partners (publishers, booksellers, suppliers) • Addressing new target audiences • Strategic partnerships
11.	**Utafutaji soko na uhusiano na umma**	**Marketing and PR**
	• Ustawi na utambulisho wa kampuni • Motto: "Picha ya kijani ni picha nzuri" • Maktaba yaanapaswa kuongoza kwa mfano (mkamilifu na mfano mwema) • Kushinda wateja / watumiaji wa maktaba juu ya uendelevu • Washiriki wadau zaidi juu ya uendelevu	• Sustainability and corporate identity • Motto: "A green image is a good image" • Libraries should lead by example (proactive and exemplary) • Win library customers/users over to sustainability • Win wider stakeholders over to sustainability (supporting / funding agencies, Friends of the

	(kusaidia / mashirika ya fedha, Marafiki wa Maktaba nk) • Athari kubwa ya kuzidisha • Hati ya utendaji wa nishati iliyoonyeshwa kwenye mlango wa maktaba ya uhusiano ya umma • Uhusiano na umma kwa shughuli za mazingira ya maktaba • Ushirikiano na mipango ya wadhamini • Habari za mazingira kwa mfano. Sehemu ya kijani katika taarifa za kila mwaka	Library etc.) • High multiplier effect • The energy performance certificate displayed at the library entrance (PR) • PR with and for the ecological activities of the library • Co-operation with sponsor initiatives • Environmental news, e.g., a green section in annual reports
12.	**Vyeti** **Vyeti vya jumba la kijani**	**Certificates** **Green building certificates**
	• LEED (kiwango cha Marekani) • BREEAM (kiwango cha Uingereza) • Green Star Rating System • DGNB Deutsches Gütesiegel • Nachhaltiges Bauen e.V. • Energieausweis nach EnEV • European Energy Award® • Solarbundesliga	• LEED (US standard) • BREEAM (UK standard) • Green Star Rating System • DGNB Deutsches Gütesiegel • Nachhaltiges Bauen e.V. • Energieausweis nach EnEV • European Energy Award® • Solarbundesliga