UNESCO CHAIR ON HIGHER EDUCATION DEVELOPMENT FOR A GREEN ECONOMY AND SUSTAINABILITY, KENYATTA UNIVERSITY

BASELINE REPORT ON GREEN ECONOMY AND SUSTAINABILITY

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DECEMBER 2021

EXECUTIVE SUMMARY

The quest to transition to a greener world is a priority across all sectors. Under this paradigm, we must vocalize this knowledge through curriculum to embed knowledge. This baseline presents an introduction to the green economy and sustainability learning. It describes some of the international discussions that have given rise to green economy studies. In addition, this baseline describes and presents a rationale for moving toward a green economy by describing current prevailing conditions that can help meet the environmental, economic, and social goals of sustainable development. It identifies the drivers and opportunities for change that have led to the adoption of a green economy approach. Multidisciplinary learning links between the environment and important economic sectors to help comprehend some of the essential improvements.

The baseline was conducted at Kenyatta University between 2018 and 2021 to demonstrate the gaps that the university has been experiencing and how the difficulties might be amended or addressed. It was guided by the following objectives: to examine the extent and format in which green economy and sustainability concepts, issues, and tools are incorporated into the university curriculum and learning programmes; to assess whether green economy and sustainability principles have been mainstreamed into university governance, operations, and outreach; to review existing institutional capacities required for greening curriculum and competencies for green economy and sustainability learning; and to identify opportunities for strengthening and up-scaling the delivery of green economy learning through higher educational institutions.

The baseline focused on green economy curricula development for institutions of higher learning: a case study of Kenyatta University. An interdisciplinary approach was used that guided the sampling of ten schools at Kenyatta University. These schools included: the School of Environmental Studies, School of Business, School of Economics, School of Agriculture and Enterprise Development, School of Education, School of Engineering, School of Pure and Applied Sciences, School of Public Health, School of Creative Arts, Film and Media Studies, and the School of Humanities and Social Sciences. A total of 100 lecturers and 227 masters' students filled out the staff and student questionnaires, respectively. Focus Group Discussions were conducted virtually, with 50 doctoral students from ten schools participating.

To link academia and industry on green economy assessment, different intersectoral interviews were conducted from eight sectors, including the Transport Sector, Agriculture Sector, Trade Sector, Education Sector, Energy Sector, Manufacturing Sector, Environment Sector, and Tourism Sectors. This gave a good platform to learn about the needs of the industry and what academia should address in order to churn out standard graduates who meet and suit the needs of the industry. As a result of the findings of this baseline study, Kenyatta University is now in a position to develop a strategy for promoting green economy and sustainability across the institution.

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ACKNOWLEDMENT

The office of the UNESCO Chair wishes to acknowledge the Vice Chancellor, Kenyatta University, Prof. Paul Wainaina, and the whole university management for allowing us to conduct the baseline at Kenyatta University as a case study. We would also like to acknowledge the contributions of all the university staff and the postgraduate students who participated in this survey.

We acknowledge all the sectors of the government, private sector, and civil society who participated in this survey by giving input that led to substantial findings in this baseline and the contributions of different individuals who advised us and encouraged us to undertake this study. Just to mention a few, a lot of thanks to Prof. Anne Tallontire and the entire University of Leeds, Prof. Saba Bokhari from the office of UNESCO Eastern Africa, and all our partners who made it possible to conduct the baseline on green economy and sustainability at Kenyatta University.

Special regards go to the steering committee members who have made it possible to conduct the baseline; Prof. Judith Waudo, Director, Centre of Gender Equity and Empowerment, Dr. James Koske, Dean, School of Environmental Studies, and Prof. John Mugubi, Dean, School of Creative and Performing Arts, film and media studies.

Warm regards also go to the Department of Environmental Studies for the marvelous support they have granted the office of the UNESCO Chair HEDGES since its inception in 2018. That won't go unnoticed or appreciated.

We wish to acknowledge the tremendous research that has been conducted by the UNESCO Chair's working team, Dr. Innocent Ngare, Duncan Omwami, Emma Atieno Ogutu, and Dennis Nyaga, for the professional assistance they have lent the office in conducting this baseline survey. We also wish to acknowledge Amos Maranga for his statistical assistance in this baseline study and send warm regards to all those who we are not able to mention by name. Thank you all. May God bless you! "

OPERATIONALIZATION OF TERMS

***Green Skills*:** Knowledge, abilities, values and attitudes needed to live in, develop and support a sustainable and resource-efficient society with sustainable modes of production and consumption (United Nations Industrial Development Organization, UNIDO)

***Green Economy*:** Resource efficient, low carbon, equitable and socio-economic transformation. It is an approach to sustainable economic growth with focus on investments, employment and skills (GESIP, 2016)

***Living Labs*:** A human centered design approach to problem solving that focuses on listening to people's needs and creating solutions tailored to meet the actual needs.

***Sustainability*:** A concept which focuses on the needs of the present generation without compromising the ability of the future to meet their own needs. It is composed of Economic (profit), Environmental (planet) and Social(people) pillars (1987 Brundtland Report)

***Circular Economy*:** A concept used to promote high resource efficiency and minimize waste by generating materials from old products through re-use, remanufacturing and recycling (UNIDO)

***Green Businesses*:** These are operations which provide safe products through environmentally friendly processed or with clean technologies to reduce negative impacts (ILO)

***Green Innovation*:** The creation of new and competitive products, services, processes, procedures and systems designed to use natural resources at a minimum level and to provide better quality of life on behalf of all.

***Green growth*:** Encouraging economic growth without limiting the ability of natural assets to provide environmental goods and services upon which we rely on.

Climate change: A long-term change in the average weather patterns that have come to characterize Earth's local, regional, and global climate. These modifications have a wide variety of effects that are associated with the word.

Education for Sustainable Development: the process of creating curricula, including subject-relevant content and pedagogy to support sustainable development. Please see page 8 for further exploration of this term (ESD,2021)

ABBREVIATIONS

GAP	- Global Action Programme
ESD	- Education for Sustainable Development
UK	- United Kingdom
GDP	- Gross Domestic Product
CO_2	. Carbon dioxide
GESIP	- Green Economy Strategy and Implementation Plan
MoE	- Ministry of Education
GoK	- Government of Kenya
UNEP	- United Nations Environment Programme
GGND	- Global Green New Deal
DK	- Deutsche Bank
UNEMG	-United Nations Environment Management Group
OECD	- Organization for Economic Co-operation and Development
WCED	- World Commission on Environment and Development
WEF	- World Economic Forum
HE	- Higher Education
GGGI	- Global Green Growth Institute
BRT	- Bus Rapid Transit
HEDGES	- Higher Education Development for a Green Economy and Sustainability
NITA	- National Industrial Training Authority
TVET	- Technical and Vocational Education and Training
MSEA	- Micro and Small Enterprise Authority
KU	– Kenyatta University
MTP	- Medium Term Plan
GE	- Green Economy
GED	- Green Economic Development
ISO	- International Organization for Standardization
GCP	- Green Chemistry Principles
PGD	- Priority Governance Direction
UNFCCC	- United Nations Framework Convention on Climate Change
MMRD	- Mixed Method Research Design

FDG	- Focused Group Discussions
UNIDO	- United Nations Industrial Development Organization
ILO	- International Labour Organization
SDG	- Sustainable Development Goals
UNESCO	- United Nations Educational, Scientific and Cultural Organization

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CHAPTER ONE: INTRODUCTION

1.1 Background

The Paris Agreement is a historic international agreement that almost every country signed in 2015 to combat climate change. The deal seeks to significantly reduce global greenhouse gas emissions in order to keep global warming to 2 degrees Celsius. The agreement paves the way for developed countries to help developing countries with climate mitigation and adaptation efforts. The Paris Agreement establishes a long-term structure that will guide the global initiative for decades and gradually increase countries' climate ambition. The Agreement's implementation is critical for achieving the Sustainable Development Goals since it lays out a plan for reducing emissions.

The adoption of the Paris Agreement on Climate Change (COP21), Africa Union Agenda 2063 and the 2030 Agenda for Sustainable Development in 2015 provides major international momentum to advance the inclusive green economy concept and its focus on integrating environmental and social considerations into economic planning and policy making. The principles of an inclusive green economy have been reiterated through the Sustainable Development Goals, i.e., Goal 8, which calls for sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all. SDG 7 calls for access to affordable, reliable, sustainable, and modern energy for all. SDG 13 also calls for the taking of urgent action to combat climate change and its impacts. This is also in line with the UNESCO priority focus area of climate change and environmental sustainability and the greening of TVETs to develop skilled workers who have knowledge of and commitment to sustainable development, as well as the requisite technical knowledge.

In line with SDG 4, the project will work to improve the quality of higher education through enhancing teaching and learning pedagogies to respond to climate change challenges related to energy and agriculture. The proposed project will therefore enable higher education institutions to empower communities to meet inclusive green economy objectives and address the sustainable development challenge. This will be done within the Global Action Programme (GAP) on the Education for Sustainable Development (ESD) framework by transforming

learning and training environments by integrating sustainability principles into higher education; building the capacities of educators and trainers for effective delivery of ESD; empowering and mobilizing youth to generate ESD actions; and accelerating sustainable solutions at the local level through community-based ESD programmes and local multi-stakeholder ESD networks. The background project will use the global partnership approach (SDG 17) in twinning Kenyatta University and Leeds University, as well as other stakeholders, who share a common interest in developing practical/action learning solutions to achieve green economy in Kenya and the UK, and sharing lessons learned through South-South and North-South networks.

Vision 2030 sets a target of 10% annual GDP growth. Projections show that under a green economy scenario, Kenya will realize faster economic growth in the long run than the baseline; the national real GDP is projected to exceed the baseline by 6–19% by 2030. In addition, CO_2 emissions are projected to be 15% lower than under the conventional business as usual growth scenario. In agriculture, policy simulations indicate that sustainable agricultural practices are expected to result in higher yields than the conventional "business as usual" model. The green growth path offers opportunities for investment, employment creation, and poverty reduction. Infrastructural developments are fundamental pillars in creating a healthy and thriving economic climate for the transformation and expansion of economic activities and enhancing sustainability in Kenya.

The Kenya Green Economy Strategy and Implementation Plan (GESIP) 2016 recommends: increasing renewable energy in the energy mix to at least 85% from wind, solar and geothermal; increasing national energy efficiency by 40% by 2030 from the current levels; increasing efficiency in agriculture infrastructure through increased irrigation using appropriate technologies for enhanced food production as well as reducing post-harvest losses by improving efficiency along the value chain; Resilience building efforts to focus on ensuring that the economy and livelihoods are less vulnerable to risks and challenges of climate change and changing growth dynamics; sustainable natural resource management to optimize the contribution of Kenya's natural resources to the economy and livelihoods**;** promoting resource efficiency to optimize usage while minimizing costs and impacts; and promoting social inclusion and sustainable livelihoods to ensure that all members of society and groups contribute equitably towards a green economy transformation.

1.2 Research Problem

Learning programs in higher education in Kenya fail to have sufficient relevance to potential employers; graduates are not perceived to emerge with the skill sets necessary to thrive and support local business and civic organizations; and business and civic institutions are not capturing the knowledge embedded in higher education institutions to innovate and meet the practical challenges they face. Capacities in planning and building enterprises to tackle future risks and opportunities remain limited, (Ministry of Education, Kenya 2012). Human development and capacity building is an enabling condition necessary for a rapid transition to a green economy in Kenya. Investing in education targeting skills enhancement, innovation, research and development in the energy and agriculture sectors will contribute to developing new technologies and harnessing existing green technologies. Our project will strengthen KU's development of a knowledge base and nurture the necessary skills for innovation and entrepreneurship related to regional and local challenges. The project will help define learning priorities and strengthen the capacity of KU to provide inclusive green economy learning. This will entail integrating sustainability principles into existing courses (i.e., environment, education, business, agriculture & enterprise development and engineering) and developing and delivering new and dedicated green economy courses. This will include adapting existing curricula to the greening of existing jobs and emergence of new green jobs.

In order to overcome these risks, it is required to sustainably increase agricultural productivity and simultaneously adapt and build resilience to climate change, while reducing or removing greenhouse gas emissions where possible i.e., agriculture must become 'climate-smart'. These include; ecologically-sound farming practices e.g. efficient use of water, extensive use of organic and natural soil nutrients, optimal tillage, integrated pest control; promotion of conservation agriculture, i.e. agroforestry and soil and water conservation; increasing the acreage under irrigated agriculture; investing in water harvesting programmes, provision of farm inputs such as fertilizers and environmentally-friendly pesticides and enhancing agricultural research, including international collaboration. These thrusts will require critical inputs and support from enabling sectors and factors such as macro-economic environment, security, infrastructure, education and social development. Furthermore, institutional reforms and better coordination will be critical (GoK, 2009), as well as better understanding of how

innovation can be diffused and integrated with indigenous knowledge and embedded farm practices.

Although there is growing national support for a green economy through the "Environment and Sustainable Development" paradigm shift, Kenya is faced with challenges in effectively implementing a green economy strategy. These, among others, include gaps in human capacity and skills in some aspects of the green economy, inadequate information, and insufficient knowledge about green technologies (GESIP, 2016). Awareness, knowledge and skills related to sustainability are key determinants for advancing green economy policy analysis, reform and implementation at all levels. Beyond targeted training for decision-makers; the transition towards an inclusive green economy requires national education and training providers to respond to a society-wide demand for new and changing skills. Other strategies required for greening the economy include: innovation, equity and social inclusion, resource efficiency, sustainability, precautionary measures and good governance.

1.3 Research Objectives

1. Examine the extent and the format in which green economy and sustainability concepts, issues and tools are incorporated into the university curriculum and learning programmes.
2. Assess whether green economy and sustainability principles have been mainstreamed into university governance, operations and outreach
3. Review existing institutional capacities required for greening curriculum and competencies for Green Economy and Sustainability Learning.
4. Identify opportunities for strengthening and up-scaling the delivery of green economy learning through Higher Educational Institutions

1.4 Research questions

1. To what extent is green economy and sustainability concepts incorporated into the university curriculum and learning programmes?
2. Has green economy and sustainability principles been mainstreamed into university governance, operation and outreach?

3. What institutional capacities are required for greening curriculum and competencies for Green Economy and Sustainability Learning?
4. What opportunities have been identified for strengthening and up-scaling the delivery of green economy learning through Higher Educational Institutions?

1.5 Significance of the Study

The high rates of unemployment among youths in Kenya are alarming, implying that graduates churned out face skills and potential inadequacy for the demanding job market. According to Heong *et al.* (2016), a review of training programs is required due to changing industry skill requirements. Institutions of higher learning should incorporate green aspects during their training on green technologies and green jobs. Higher institutions of learning are seen as living labs embedded with knowledge infrastructure for transformative change. The study was conducted to reorient education towards sustainable development with the main aim of integrating dynamics in academia, the socio-economic environment, and human development in all disciplines, employing holistic and action-oriented learning as an effective means of communication. The findings from the study are aimed at enriching existing gaps in higher institutional green curriculum vision and policy formulation both in academia and industry at administrative and managerial levels.

CHAPTER TWO: LITERATURE REVIEW

2.1 Green Economy Evolution

A green economy is defined as one in which value and growth are maximized throughout the economy while natural assets are managed in a sustainable manner. A thriving low-carbon and environmental goods and services sector would support and enable such an economy. Environmental damage would be reduced, while energy security, resource efficiency, and climate change resilience would all be improved.

The concept of "green economy" was first coined in 1989 by a team of environmental economists in the UK for a study aimed at informing the government and advising it on understanding the term "sustainable development" as well as the consequences of sustainable development for measuring economic progress and evaluating projects and policies (Pearce, Markandya and Barbier, 1989). The report was later followed up with a study in 1991 and 1994 through an upgrade of the report from Blueprint to Greening the World Economy and Blueprint and finally to Measuring Sustainable Development.

The Blueprint report's theme was on economics that should help environmental policy making and expand on global economic issues such as climate change, ozone layer depletion, tropical deforestation, and resource depletion overriding in developing countries. The word was later reinstated in 2008 during the debates on improving the policy and in response to a number of global crises. Following the financial crisis and predictions of a global recession, UNEP advocated the idea of "green stimulus packages," outlining specific areas where large-scale government investment could jump-start a "green economy" (Atkisson, 2012), and as a result, many governments implemented the green stimulus packages.

1. In October 2008, UNEP initiated a Green Economy Initiative to provide research and policies that support green sector investment for a friendly green environment. As part of the initiative, UNEP commissioned one of the first authors of the first Blueprint for a Green Economy to write a study called "Global Green New Deal" (GGND), which was published in April 2009 with the suggestions on the policy measures. The measures were an initiative to promote economic growth with the aim of improving

global economic sustainability. The GGND urged policymakers to devote a large portion of stimulus funds to green industries and set three goals: Economic recovery

2. Poverty eradication
3. Reduced carbon emissions and ecosystem degradation

The above goals suggest a structure for green stimulus projects as well as domestic and foreign policies that would help them. In June 2009, the United Nations issued an interagency statement endorsing the green economy as a transformation to solve numerous crises. The General Assembly decided in March 2010 that one of the two specific themes for Rio+20 would be a green economy in the light of sustainable development and poverty eradication. This prompted a spike in international interest in the green economy and related ideas and a slew of new studies and other materials aimed at further defining and demystifying the idea.

UNEP's flagship Green Economy Report, published in November 2011 as part of its Green Economy Initiative, was one of the key reports. UNEP collaborated with think tanks and commercial players (including Deutsche Bank) to give its economic assessments credibility. A green economy is described as "a resilient economy that provides a better quality of life for everyone within the ecological limits of the earth". There is no universally accepted definition of "green economy," and recent publications have listed at least eight different definitions. The United Nations Environment Programme has described the green economy as "one that dramatically reduces environmental risks and ecological scarcities while enhancing human well-being and social equity. It has a low carbon footprint, is resource-effective, and is socially inclusive. This description has been cited in many recent studies, including those from the UNEMG and the OECD.

2.1.1 Green economy curriculum

In recent decades, public concern about the detrimental effects of human actions on the environment has developed in response to a series of global environmental crises that occurred at the end of the last century. According to the 1987 Brundtland Report of the World Commission on Environment and Development (WCED), sustainable development is described as "development that meets the needs of current generations without jeopardizing

future generations' ability to meet their needs." During this time, the subjects of sustainability and sustainable growth became increasingly popular, and they were widely discussed in science and political circles. Despite initial limited progress, the aforementioned subjects were included in a large number of national and foreign policies. Many players are now fighting to achieve the so-called Sustainable Development Goals (SDGs), also known as Global Goals, which were developed under the 2030 Agenda for Sustainable Development in order to eradicate poverty in all of its forms on the entire planet.As a result, businesses and other organizations are better positioned to consider the importance of environmental problems in economic outcomes. The World Economic Forum (WEF) focused on the analysis of long-term competitiveness, emphasizing the importance of monitoring long-term growth factors in order to improve competitiveness.

Agenda 21, which stresses the need for Education for Sustainable Growth, acknowledged the value of including the higher education (HE) sector in the fight for a healthier world as early as 1992. Specifically, many studies have demonstrated the impact predictor of appropriate learning about sustainable development and responsible student behavior. According to, ESD, for example, causes a shift in people's attitudes, resulting in a 10–20 percent reduction in energy usage. The aim of this approach to education is to connect ecological, economic, and environmental considerations in the classroom. As a result, universities must provide more content related to sustainable development in their study programs, while also stressing the importance of environmental actions in the broader society. Universities all over the world are attempting to green their programs and courses in order to contribute to the achievement of global targets in the area of sustainable development. As a result, the educational system would allow people to take greater care and responsibility for the environment, ensuring a sustainable future for future generations. A green curriculum, according to the authors, is one that "takes environmental preservation, natural conservation, resource conservation and fair use, and environmental friendliness advocacy as the primary material and teaching goals."

Universities aim to demonstrate their dedication to environmental preservation in a realistic way by creating sustainable campuses in addition to incorporating green materials into their teaching. This academic group practice entails the active participation of teaching staff, students, and university partners who have a lot of potential to help themselves and others

live in a healthy world, and some of the best ways to inspire them are to evaluate green content in a curriculum and to use eco-labels.

Sustainable business development, green business, sustainable business models, corporate sustainability and responsibility, environment and sustainability, sustainable economic growth, governance and sustainability, social capital and green economy, disciplinary and interdisciplinary research paradigms and strategies, climate change mitigation, adaptation, and economic development, green economy, and sustainability will all be covered in the Green Economy Curriculum. The focus will be on progressively developing skills for employability and transitioning towards a green economy. These key competencies in sustainability that will allow complex constellations of issues across thematic areas to be addressed include transformational, technical, governance, management, and participatory competencies (Okanovi *et al.,* 2021).

2.1.2 Green Economy Learning in Higher Learning Institutions

In recent decades, public concern about the detrimental effects of human actions on the environment has developed in response to a series of global environmental crises that occurred at the end of the last century. According to the 1987 Brundtland Report of the World Commission on Environment and Development (WCED), sustainable development is described as "development that meets the needs of current generations without jeopardizing future generations' ability to meet their needs." During this time, the subjects of sustainability and sustainable growth became increasingly popular, and they were widely discussed in science and political circles. Despite initial limited progress, the aforementioned subjects were included in a large number of national and foreign policies. Many players are now fighting to achieve the so-called Sustainable Development Goals (SDGs), also known as Global Goals, which were developed under the 2030 Agenda for Sustainable Development in order to eradicate poverty in all of its forms on the entire planet.As a result, businesses and other organizations are better positioned to consider the importance of environmental problems in economic outcomes. The World Economic Forum (WEF) focused on the analysis of long-term competitiveness, emphasizing the importance of monitoring long-term growth factors in order to improve competitiveness.

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national strategy and a five-year plan for green development, allocating 2% of its gross domestic product to investments in renewable energy, energy conservation, clean technology, and water. In addition, the government has established the Global Green Growth Institute, which aims to assist countries (particularly developing countries) in developing green growth strategies.

In Mexico City, congestion has prompted a big push to promote Bus Rapid Transit (BRT), an advanced bus system that uses dedicated lanes on city streets. Significant public investment in the BRT has shortened travel times and air pollution while also improving public transportation access for those who cannot afford private cars. This remarkable success is now being repeated in cities across Mexico, prompting the federal government to invest for the first time in urban public transportation.

China now spends more on renewable energy than any other nation. In 2010, its total installed wind capacity increased by 64%. This expansion is fueled by a national strategy that sees renewable energy as a big market in the near future, one in which China hopes to gain a competitive advantage.

Namibia manages its natural resources to support the economy, society, and climate. Within the borders of "communal conservancies," local people around the country are given the right to use and benefit from wildlife and other natural resources. Hundreds of thousands of Namibians in rural areas are fed and employed thanks to an economic opportunity to maintain these areas sustainably. Women hold more than half of the jobs, and wildlife populations are on the rise.

Green Economy Learning in universities will be the potential unlocking pathway towards having society's challenges addressed. Learning green economy concepts and transition models will aid in positioning and preparing higher education institutions to impact knowledge on green skills and green entrepreneurship learning. Universities need to review their curriculum in a way that they consider having teaching modules modified and restructured to address the needs and requirements of the industry for youth employability and innovation development. Therefore, we can make green economic learning a solution to our problems in skills learning, creating green jobs, and being a pathway to green growth in our nation.

2.1.3 Competence-Based Learning

i) Commission for University Education

The Commission for University Education was established by an Act of Parliament, Universities Act, No. 42 of 2012, as the successor to the Commission for Higher Education established under Universities Act Cap 210B of 1985. This was to address the need to regulate, coordinate and assure quality in university education as a result of the growth and expansion of the university sub-sector in Kenya. The Commission was established as a corporate body to make better provisions for the advancement of quality university education in the country. Therefore, as the UNESCO Chair on Higher Education Development for a Green Economy and Sustainability, we recognize and acknowledge their mandate and role in ensuring quality education for learning institutions. In fostering competency-based learning, we will seek guidance from the commission to approve our green economy learning curriculum and advice on how it can be mainstreamed into the existing courses we have in our learning institutions. Through our baseline survey, it informs the existing curriculum of the needs that industry requires from academia as they churn out graduates; therefore, a green economy curriculum is needed to reinforce our existing curriculum.

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ii. NITA - TVET Greening approach

With reference to Authority (2021, May 1), the TVET Act No. 29 of 2013 specifies the TVET management and administration structure, as well as the guidelines for delivering TVET. It emphasizes the importance of developing diverse and sensitive curricula to improve life skills and technology transfer through collaboration between TVET institutions and industries. It also creates the TVET Authority, which is in charge of registration and quality assurance, as well as the Curriculum Creation, Assessment, and Certification Council, which is in charge of developing a curriculum for the aforementioned purpose.

The Sessional Paper No. 1 of 2015 on Reforming Kenya's Education and Training Sectors establishes Kenya's three education sectors, namely primary, secondary, and post-secondary education. It contains a number of recommendations aimed at pushing for changes in

education access, affordability, efficiency, and relevance. Governance and management, teacher recruitment and development, planning and implementation, monitoring and assessment, and funding by increased public-private partnerships are all included in these recommendations.

The TVET sector also includes religious institutions, private industries, the Micro and Small Enterprise Authority (MSEA), and the National Industrial Training Authority (NITA). MSEA is in charge of regulating, harmonizing, and coordinating the sector's development. It was established in 2013 with the aim of training entrepreneurs in industry, management, and leadership skills while also easing their access to the labor market. NITA is responsible for industrial training, including the evaluation and collection of industrial training levy and fees as well as the education and qualification of trainers. It is in charge of developing curricula, incorporating labor market data, ensuring certificate equivalence, accrediting organizations that evaluate industrial training, evaluating occupational skills, and awarding certifications. The Industrial Training Act No. 12 of 2012 created it.

2.2 Green Campuses

Green campuses are institutions that apply green practices in their daily activities to minimize their carbon footprint while promoting sustainable development by working with eco-friendly materials/ initiatives. In terms of population and city characteristics, the institutions of higher learning are comparable to smaller cities that also have several things occurring that affect the surrounding environment. These institutions put forward green efforts in the direction of sustainability with initiatives to conserve natural resources, which support energy efficiency, in making workplaces and keeping the surroundings clean, while conserving the environment. A multipurpose approach to environmental sustainability results is used in the facilities, which implement a variety of multidisciplinary green techniques, in obtaining environmentally sustainable outcomes (Jnr, 2020).

a) Curriculum, Teaching and Research & Innovation

Institutions of higher learning serve as sources of discourse and to help change the society in which they are situated. They're the world leaders in research, innovation, and education; thus,

they are important areas to work in if we want to work towards long-term progress and produce current and enable future generations to do the same (Finlay and Massey, 2012).

b) Facilities and Operations (Agriculture, Water, Energy and Waste)

Green initiatives that contribute toward energy saving, waste management, CO_2 reduction, water management and other areas include: developing green buildings; decreasing water consumption and wastage; encouraging the university community to move around the campus on bicycles, which are provided for use free of charge; campus-wide recycling initiatives and (Jnr, 2020).

c) Student's Involvement

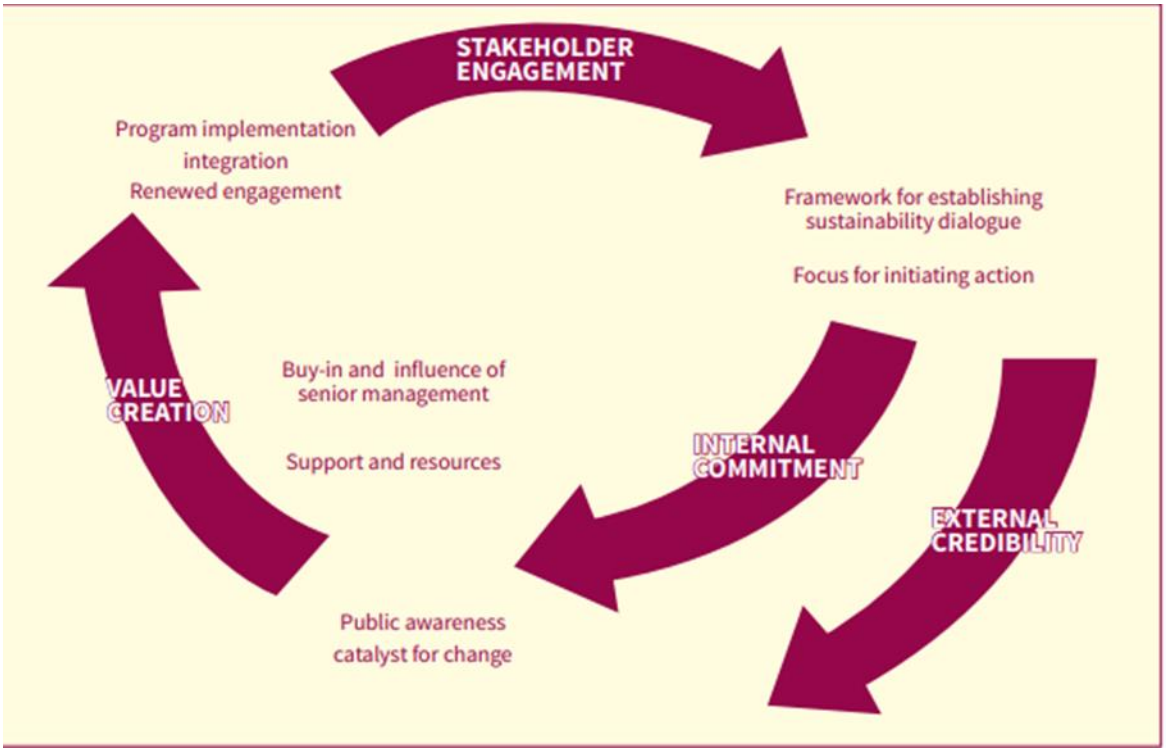
Top management of institutions of higher learning must be dedicated to engaging staff and students since this is the best way to ensure the effective initiation and implementation and long-term viability of campus sustainability initiatives (Green and Campuses, 2013).

d) Governance and Management

Institutions of higher learning should be dedicated to protecting the environment as an integral part of their good institutional practice. The campus should develop and maintain an environmental management system that will lead to sustainable development that impacts positively on the human and environmental health of the immediate community and neighbors (Green and campuses, 2013).

e) Community Engagement

Community engagement and participation are a hot topic in research and teaching, as well as a topic with practical implications in governance and the private sector, but universities may be unable to walk the talk. However, as with other facets of greening the university, there are tried and true methods for inspiring, educating, and engaging the university's and broader community's participation (Green and Campuses, 2013).



Community Engagement.
Source: Green and Campuses, 2013

2.2.1 Green Economy Principles

A green economy is thought to be an alternative vision mainly for growth and development. It helps in generating improvement and growth in terms of the lives of people, chiefly in ways that are consistent with sustainable development (Moşteanu *et al.*, 2020). A green economy also helps in promoting a triple bottom line that advances and sustains environmental, economic, and social well-being.

The green economy is a transformative change and universal to the global status quo, and it requires government priorities as far as the fundamental shift is concerned (Shabunina *et al.,* 2017). These government priorities are needed to take a position on environmental and social aspects. They include climate, environmental, and social challenges that are continuing to intensify (Ivlev & Ivleva, 2018). There are financial ones that aid in the realization of economic progress and sustainable development goals.

2.2.1 Principles of Green Economy

Principles of green economy include: good governance, efficiency and sufficiency, planetary boundaries, justice and well-being (Loiseau *et al.,* 2016). Green economy is based on the five key points which civil life prioritizes and includes such as social dialogue, public participation, transparency, informed consent, as well as accountability. According to Mealy & Teytelboym (2020), principles of green economy include: *well-being, justice, planetary boundaries, Efficiency & sufficiency and Good governance.*

Well-being: A green economy should create a sustained, genuine, shared well-being and going beyond scanty monetary healthiness just to priorities health, development, happiness of human development, community and education.

Justice: A green economy usually emphasizes on equality, equity, community cohesion, as well as supporting human rights (this is especially the rights of minorities and marginalized. It seeks a just transformation and provides all citizens interests, inclusive of those who are not yet born.

Planetary boundaries: A green economy admits that every human that is flourishing usually depends upon a healthy natural world. It normally secures the intrinsic worth of nature, and gives protection of soil, biodiversity, air, water and other capitals of the ecosystem.

Efficiency & sufficiency: A green economy is diverse, low-carbon and circular. It acknowledges that planetary boundaries normally place practical limits to growth of the economy and aligns incentives of economics with true costs to societies.

Good governance: A green economy usually builds institutions that put together dynamic democratic accountability with a sound basis in natural and social science and local knowledge. Civil life prioritizes on public participation, transparency, informed consent and accountability.

2.2.2 Paris Accord and Agenda 2030 Green Vision

The Paris Agreement is a historic international agreement that almost every country signed in 2015 to combat climate change and its negative consequences. The deal seeks to significantly reduce global greenhouse gas emissions in order to keep global warming at 2 degrees Celsius

above pre-industrial levels this century while still finding ways to keep it at 1.5 degrees. Major emitting states have agreed to reduce their climate emissions and to strengthen their commitments over time as part of the agreement. The pact establishes a mechanism for consistent monitoring, reporting, and ratcheting up of countries' individual and collective climate targets, as well as a roadmap for developed countries to assist developing countries in their climate mitigation and adaptation efforts.

The agreement includes commitments from all countries to reduce emissions and collaborate to adapt to the effects of climate change, as well as a call for countries to improve their pledges over time. The agreement paves the way for developed countries to help developing countries with climate mitigation and adaptation efforts while also establishing a mechanism for consistent monitoring and reporting of countries' climate targets.
The Paris Agreement establishes a long-term structure that will guide the global initiative for decades. The aim is to gradually increase countries' climate ambitions. The agreement specifies two review mechanisms, each over a five-year period, to help with this. The Paris Agreement is just the start of a transition to a low-carbon world; there is still more work to be done. The Agreement's implementation is critical for achieving the Sustainable Development Goals since it lays out a plan for reducing emissions and increasing climate resilience.

The Green Economy Policy and Implementation Plan 2016–2030 aims to help Kenya achieve a higher rate of economic growth in line with Vision 2030, which strongly embeds sustainable development concepts in the overall national growth strategy. This strategy builds on the successes achieved during the first Medium Term Plan (MTP I) for Vision 2030 (2008–2012) and the ongoing implementation of MTP II (2013–2017).

The Ministry of Environment and Natural Resources spearheaded the creation of the Green Economy Strategy and Implementation Plan (GESIP) through an inter-agency steering committee chaired by the Principal Secretary. The GESIP macro policy framework identifies the enabling conditions for a rapid transition to GE, including maintaining macroeconomic stability for green growth, human development, and capacity building; prioritization of GE implementation within the devolved government system; governance and sustainable structural transformation; sustainable financing; cost of doing business reduction; and

establishing a green growth strategy. The proposed policy mix aims to align national policies in order to promote and accelerate the greening of the economy by resolving shock vulnerability.

2.2.3 GESIP, MTPs - 2030 agenda, Climate Change Act 2016

The Green Economy Strategy and Implementation Plan of 2016–30 (GESIP) supports achieving a higher growth rate aligned with the government's overall development strategy for 2030. This strategy builds on the successes achieved during the first Medium Term Plan (MTP I) for Vision 2030 (2008–2012) and the ongoing implementation of MTP II (2013–2017).

Agenda 2030 is a new development plan for Kenya that covers the years from 2008 to 2030 and has been named Kenya Vision 2030: a creative strategy. By the year 2030, it aims to create a new middle-income country in which all its citizens can enjoy a higher quality of life. The development of the vision was conducted through an inclusive and participatory consultation that brought Kenyans from all levels of society to the table. Following the transition from poverty to global wealth and power, has also been helped by other newly-industrializing countries that have emerged from war zones, such as Columbia and India. The building's structure is derived from three pillars: economic, social, and political.

The Climate Change Act of 2016, which creates a National Climate Change Council that is chaired by the President and vice-chaired by the Deputy President, serves as an overall national climate change coordinating mechanism. It also creates the Climate Change Directorate, which will serve as the Council's secretariat and the government's lead agency on national climate change policies and actions. The Act also requires the Cabinet Secretary to develop a National Climate Change Action Plan, which must be revised every five years and be subject to a two-year implementation review. The Act also gives the National Climate Change Council the authority to delegate climate change and climate change action plan implementation responsibilities to both public and private organizations (Part IV). It also creates the Climate Change Fund as a funding vehicle for the council's prioritized climate change efforts and initiatives.

2.2.4 Green Policy Instruments – Public Investment in Sustainable Infrastructure

Governments may use a variety of public policy instruments to encourage behavioral changes that lead to long-term sustainability. Instruments range from the most extreme regulatory instruments, also known as "command-and-control" mechanisms, to a combination of incentives and disincentives like economic instruments. The least intense is on the educative or voluntary instruments that will depend on the degree of public intervention. The term "stick" (regulation) is sometimes used to describe a coercive action, while "carrot" (economic instruments) is used to describe a collection of incentives or disincentives, and "sermons" (educative or voluntary instruments) is used to describe a means of informing society of the benefits or drawbacks of a particular behavior. This distinction, however, can be misleading because, on the one hand, economic instruments may be used as a "stick"; on the other hand, the line between regulatory, economic, and educational instruments is blurred, and in many instances, the adopted policy is the product of a combination of approaches.

Sustainable infrastructure investment is critical for society and the economy. It contributes significantly to more inclusive economic, social, and environmental conditions, which can boost development. Global policy decisions are aimed at encouraging higher levels of infrastructure investment for long-term growth as well as optimizing the long-term benefits to society. Public policy plays a critical role in the agenda to foster sustainable development and manage climate change through improved infrastructure. This is due in part to the fact that the government is a big infrastructure investor. However, public policy is more relevant because it sends signals and establishes regulatory and institutional mechanisms that affect the behavior of all actors, including private investors and consumers.

The development of infrastructure, economic growth, and climate security are all linked. Infrastructure is a critical component of economic development and growth. By raising global aggregate demand today and laying stronger foundations for future growth, infrastructure investment will play a particularly important role in the current context of growing concerns about global growth prospects. Infrastructure is an essential part of the climate change agenda as well. When done incorrectly, infrastructure contributes significantly to the problem; infrastructure accounts for more than half of global carbon emissions. When done correctly, it is a critical component of both climate change mitigation and adaptation.

2.3 Green Competencies (Transformational, technical, management & participatory competencies)

"Green competencies" refer to a person's ability to communicate constructively and efficiently with the natural world. Green competencies are a six-dimensional framework that includes awareness, expertise, skills, abilities, attitudes, and behaviors. Employees who are mindful of the negative effects of their actions on the environment are referred to as "green." Green consciousness is necessary in general to reduce the negative effects of one's environmental footprint. Furthermore, knowledge and skills derived from green competencies are critical in the development of environmental consciousness, especially in emerging economies. Green awareness, which is a byproduct of green competencies, is general knowledge of facts and principles relevant to the natural environment and its biodiversity. Furthermore, workers benefit from green awareness because it allows them to understand appropriate concepts and models related to the environment (Gull *et al.,* 2021).

2.3.1 Transformational Competencies

Green transformational leaders provide workers with a clear vision, encouragement, inspiration, and motivation, as well as growth opportunities that will help the company meet its environmental goals. They build and incorporate environmentally conscious cultures into their businesses (Rizvi *et al.,* 2020). Proper leadership has the power to boost workers' green imaginations by inspiring them and creating an environment that encourages it. Transformational leadership thus raises subordinates' awareness of higher values like democracy, justice, equity, and humanitarianism and inspires subordinates to prioritize organizational goals over personal goals. Transformational leaders' ability to motivate their followers is determined by four behavioral components: inspirational encouragement, charisma, personal focus, and intellectual stimulation (Jia *et al.,* 2018).

2.3.2 Managerial Competencies

The only constant that decides a company's performance is its employees' knowledge and skills. These are based on managers' knowledge and skills, which can either stifle or encourage their growth. Effective managers have built and emphasized the following competencies: the ability to build good social relationships, a strong appetite for improvement, as well as

problem-solving, strategic planning, and change readiness. Personal attributes, motivations, abilities, expertise, self-image, cognitive, and social skills are some of the essential characteristics that are used to assess competencies. The beliefs and cognitive abilities of those with the most control in an organization influence organizational, strategic, and performance outcomes (Verle *et al.,* 2014).

2.3.3 Participatory Competencies

Participatory competencies involve teams participating in their discussions, identifying individual and collective preferences, and listening to their ideas and requests (empathy). Inclusive participation means collective conflict resolution, having the ability to collaborate on solutions and to put everyone at ease, to see things from everyone's point of view, and to feel the weight of the concerns of participants (empathic leadership) (Quelhas *et al*.,2019)

2.3.4 Technical Competencies

Technical competence involves action research for sustainability, for instance, the use of knowledge, skills, and attitudes collectively to solve real-world sustainability challenges. Five components are integrated in creating knowledge and action (Wiek *et al.,* 2011).

i. ***Systems-thinking*** - competence means the ability to comprehend both the immediate and underlying causes of sustainability issues.
ii. ***Anticipatory competence*** - is the capacity to think about how the future will be for the coming generations. It requires understanding of the different types of futures, i.e., possible futures (based on notions of plausibility), probable futures (those determined "likely" to occur), and desirable futures (value-laden; based on sustainability principles).
iii. ***Strategic competence*** - The ability to collaborate on strategies to support sustainability efforts includes an understanding of the strategies to utilize change and policy to regulate behaviors and environmental impacts as well as design and lead them. It is having the awareness and capability of the potential to alter one's surroundings to produce change. Individuals with these competencies understand how to build strategies, concepts, and methods that they can relate to real-world situations.

iv. ***Interpersonal competence-*** This involves the capacity to encourage and guide innovation while conducting both research and resolving problems. People work together as individuals, respect other individuals who are from different backgrounds, communities, and make their involvement easier. This competence requires strong communication and negotiation skills, as well as expertise to collaborate with other stakeholders in different sectors. Moreover, this competence is a basic ingredient for other competencies.

v.

vi. ***Normative competence*** - Equity and social justice are alluded to as concepts that consider concepts of justice, equity, social-ecological integrity, and ethics. This competence involves understanding how concepts differ in different cultures and how these diverse concepts can be used in solving sustainability problems.

2.3.5 Green Skills

Skills shortages have been a barrier to the greening of economies in both developed and developing countries. This is why learning how to make smooth transitions is such an important part of the process. For all sectors with high growth potential for green employment, there are common standards for meeting skill needs. It would be a mistake to put a premium on high-end skills. Engineers, designers, and researchers are required to create new technology and work processes that are more environmentally friendly. Going green, though, necessitates technicians to apply it. These jobs are known as "environmental careers." A wider range of business and social skills is essential to achieve economic and social justice. They include: entrepreneurial skills (to seize the possibilities of low-carbon technologies); management skills to ensure processes are swift and efficient; core skills to learn and innovate; Policymakers must have the ability to set the right incentives and create enabling conditions for cleaner production and transportation (Huq et al., 2007; Abramovitz et al., 2002).

2.3.6 Learning and Skills

It is widely accepted that learning does not and should not take place outside of the context of beliefs.The competences of all members of our community—identified as information, skills, attitudes, and values—are essential for long-term growth. All learners can gain the skills,

knowledge, and values necessary to participate as active citizens in the creation of a more sustainable society (Cedefop) (2009). A just transition needs not only policymakers, but also worker and employer organizations, civil society organizations, and the general public to learn about sustainability. To encourage clean production and use, sustainability content must be embedded in education and training at all levels. It's important to think about who gets updated in order for a fair change to happen. Climate change adaptation measures must be focused, mostly on the most vulnerable social groups and geographical regions. People in low-lying areas and poor people in developing countries, who are mostly engaged in agriculture in tropical, semi-arid, or arid regions, are disproportionately affected, as their economic activity and location are the most climate-sensitive. Poor people are more vulnerable to changes in cities and therefore need special attention (Huq et al., 2007; Abramovitz et al., 2002).

2.3.7 Green Entrepreneurship (Green Enterprises, Green Business)

Green business has been a controversial research field since the 1990s and could be identified by a range of related terms, including Eco-entrepreneurship, Eco-preneurship, environmental entrepreneurship, sustainable entrepreneurship and ecological entrepreneurship. Green business consciously tackles environmental and social challenges and needs and creates brilliant innovative and entrepreneurial ideas for solving them (OECD, 2011; Vatansever, and Arun, 2016). Primary, green entrepreneurship aims to:

- Innovative businesses to solve environmental problems;
- Targets public support for research & development of environment sound technologies;
- Strategic investment through public sector development outlays,
- Incentive programs & partnerships;
- Getting prices right-removing subsidies on natural resources & imposing taxes on environmental degradation – policies on solid waste management

> "*Compared with traditional entrepreneurship, green entrepreneurship has three unique characteristics, namely, ecological, reliance on green consumers, and reliance on policy support. Green entrepreneurship is regarded as the process that identifies, evaluates, and possesses entrepreneurial opportunities that are based on sustainable, environmentally friendly, and green principles. Green entrepreneurs dedicate to innovate green products and technologies to market so that replace traditional products".*

Green enterprises can be divided into two categories: enterprises with established environmental management or clean manufacturing practices and new enterprises based on environmental and natural resources and thus eco-friendly. Both need highly skilled green professionals and experienced experts. Deeply skilled and highly experienced professionals are a constraint on the green economy. In developing and developed countries, a lack of professionals and a shortage of university graduates in general, especially those trained in Science, Technology, Engineering, and Mathematics (STEM), have been challenges in the realization of the green economy. For example, while the Chinese government has made great strides in making economic development in the country "greener" than before, China's "green transition" has been marked by a lack of a clear Green Skills Mechanism and policy framework (Ye *et al.,* 2020).

2.4 Opportunities for Strengthening Green Economy Learning in Higher Education Institutions

Green growth, which is essential for the future of a better life, is a necessary condition for sustainable development. Green development is focused on the efficient use of resources as well as systematic environmental protection and takes account of development quality and development efficiency. Green development, however, entails harmonious and unified economic, ecological, and social development, which is particularly important in green economic development (Wang *et al.,* 2019).

i. Curriculum Development

Reevaluating and revamping education from kindergarten to universities to provide a clear focus on developing knowledge, skills, perspectives, and sustainable values in current and future societies. In this way, we examine existing curricula in terms of their aims, content, and transdisciplinary approaches to education, learning, and evaluation, and social, economic, and environmental sustainability. (Louw, 2013).

ii. Green Skills Development for the Industrial Needs (Private and Public)

Green education is not only about training skills for certain jobs but also a more holistic educational process involving various types of educational institutions and structural initiatives.

"Higher education is viewed by many as an important knowledge generation and acquisition platform where skills can also be developed for the future we want. The world's higher education institutions have been involved in initiatives that include conservation education, environmental education, education for sustainable development and climate change education" - Dhamo, 2014

iii. Practical Based Green Research

Higher institutions of learning should serve as "testing beds" that churn out solution-based research. Developing well-embedded infrastructure transitions to pragmatic research that informs both academia and industry. Green Research will yield positive results in practicing green economy principles and learning in our institutions. The solution-based research will transition the learning curriculum to a green-based curriculum development oriented to solving the industry's needs.

iv. Policy Development and Policy Contributions

The development of education and training policies and strategies will be one area in which institutions of higher learning can contribute to the green economy. The development of green policies and guidelines will foster green economy learning and integration in higher learning institutions. The learning process will change the behaviors of the learners and shift their attitudes towards green innovations and green practices.

v. Integration of Green Economy Learning in Institutions of Higher Learning

This strengthens linkages between academia and industry to address an appropriate response to climate change through green economy learning programs. The integration will provide an avenue for addressing the industry's needs and transitioning to green economy pathways that will solve the challenges of youth employability and poverty in low- and middle-income countries.

2.4.1 Green Financing

Green finance is an approach to bringing the financial sector into the transformation process to resource efficient, lower carbon, and resilient economies in the adaptation to climate change. Green growth is a long-term economic growth strategy focused on increasing sustainability according to ecological principles, creating opportunities for employment and generating new profits. Green financing fosters economic growth, environmental improvement, and the development of the finance industry. The main aim is to channel sufficient funds into the target through the intervention of public agencies in the market process (Sundararajan *et al.,* 2016).

Green financing supports green investments that provide environmental benefits through instruments/initiatives, such as carbon market instruments, fiscal policy, green banks, green bonds, green central banking, community-based funds/village funds (fund small- and medium-sized green projects) in order to achieve the Sustainable Development goals. Green banks offer better credit conditions for green projects, create innovative financial products and provide market information on the advantages of the green projects. Green bonds help finance green projects by providing long-term, reasonably priced capital to refinance a project once it has passed through the construction phase and is operating successfully (Sachs *et al.,* 2019). Green central banking takes environmental factors such as climate change mitigation into consideration when formulating monetary policy, as well as the price stability in the design of financial regulations. The central banks are not only responsible for but also required to incorporate environmental factors into their existing frameworks, and must make sure available tools are used actively to promote green investment, or discourage brown investment, and actively employ green initiatives (Dikau *et al.,* 2018).

Renewable energy, energy efficiency, pollution prevention and control, environmentally sustainable management of living natural resources and land use, terrestrial and aquatic biodiversity conservation, clean transportation, sustainable water and wastewater management, climate change adaptation, eco-efficient and/or circular economy adapted products, production technologies, and processes, and green buildings are all examples of green projects (Azhgaliyeva et al., 2020).

Sources of green finance

There are three sources of green finance:

1. Domestic public finance - Direct funding by a government
2. International public finance - Funding from international organizations and multilateral development banks
3. Private sector finance - Comprises of both domestic and international funding sources

2.4.2 Employability – Graduate Career Opportunities, Student Enterprise, Apprentice, Internship, Practicum

As the number of graduates entering the labor market continues to rise, the graduate labor market is in flux. In this setting, the relationship between higher education and employment has become increasingly complicated. According to research, a growing number of graduates are finding work in so-called "non-traditional graduate jobs." In light of this, there is a growing belief that the small business sector will absorb an increasing number of graduates. Graduates are being encouraged to pursue a career in the small business sector by starting their own business, according to unique policy initiatives. These programs share two characteristics: they are supply-driven rather than demand-driven, and they are based on a "skills" concept. Higher education institutions strive to provide students with innovative, enterprising, and entrepreneurial skills (Matlay *et al.,* 2006).

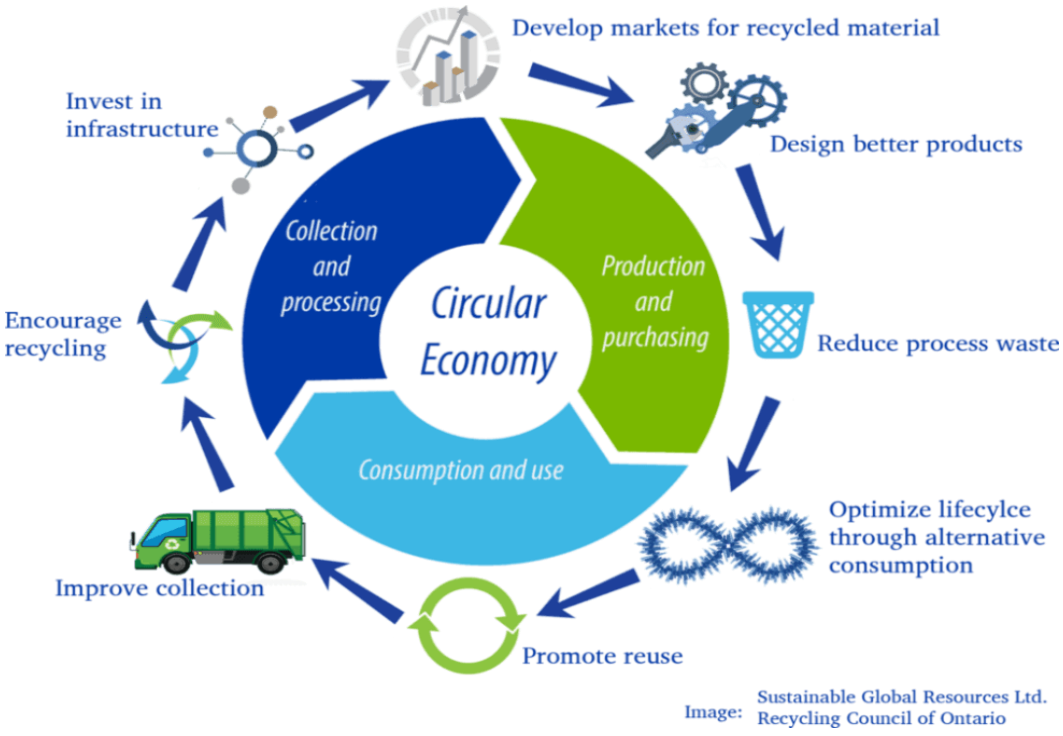
An organization's human capital investment is needed to find qualified employees with exceptional working skills. On-the-job training expenses include the worker's and coworkers' time spent learning productivity-boosting skills, as well as the equipment used to teach these skills. The improvement in the worker's productivity is a measure of the investment's return over time. Furthermore, professional employees have a better chance of finding jobs than non-skilled workers because they have specialized knowledge and can complete tasks more efficiently. On-the-job experience (internships, apprenticeships, and practicums) introduces students to real-world business and employment processes in which they will work as employees. As a result, students are taught how to be responsible, effective, and productive at work. Students have the opportunity to put their talents, expertise, and mindset to the test in the workplace (Verecio, 2018).

2.6 Green Innovation – Circular Economy, Industrial Symbiosis

2.6.1 Circular Economy

A circular economy is a structural approach to economic development that greatly benefits businesses, society, and the environment all at the same time. A circular economy, as opposed to the "take-make-waste" linear model, is sustainable by design and seeks to progressively disentangle growth from the consumption of limited resources. The Circular Economy concept is a long-term business response to the impacts of climate change. It entails considering the end result of the product from the start. It entails creating products that can be reused, refurbished, and repaired. "Using one's waste product as a raw material for another" (Aka, 2019).

Green Economy Concept nexus is presented below through a schematic diagram.



Realizing a circular economy will require concerted action on several fronts: At all levels—social, technological, and commercial—research and innovation are required. Economists, as

well as environmental and materials scientists, must evaluate the environmental impacts, costs, and benefits of products. The use of modular systems and standardized components, for example, should become the norm when designing products for reuse. More research is required to persuade businesses and governments. In order for manufacturers and the populace to become aware of the responsibility of their products throughout their service lives, communications and information strategies are needed (Stahel, 2016).

2.6.2 Green Chemistry Principles on Circular Economy

Globally, the GCP practice towards the circular economy has been implemented and embedded in the international movement of GCP in worldwide policy, for instance in Canada, China, Germany, Japan, South Korea, Sweden, Taiwan, the United States, and the United Kingdom. Through GCP analysis, the policy practices are well suited to governance, industries, and education (Chen et al., 2020).

Green chemistry principles (GCP) are expansively arrayed in industrial management, governmental policy, educational practice, and technology development on a global scale. A circular economy always aims to balance economic growth, resource sustainability, and environmental protection. The GCP concept has been developed holistically since the 1990s to prevent and reduce chemical dangers that benefit sustainable environmental approaches from industries through green innovations. The GCP and circular economy proposal combines strategies for GCP implementation from the facets of governance, industry, and education. This domiciles a current grading system for GCP, dividing it into three categories: pollution and accident prevention, safety and resource sustainability, and energy and resource sustainability.

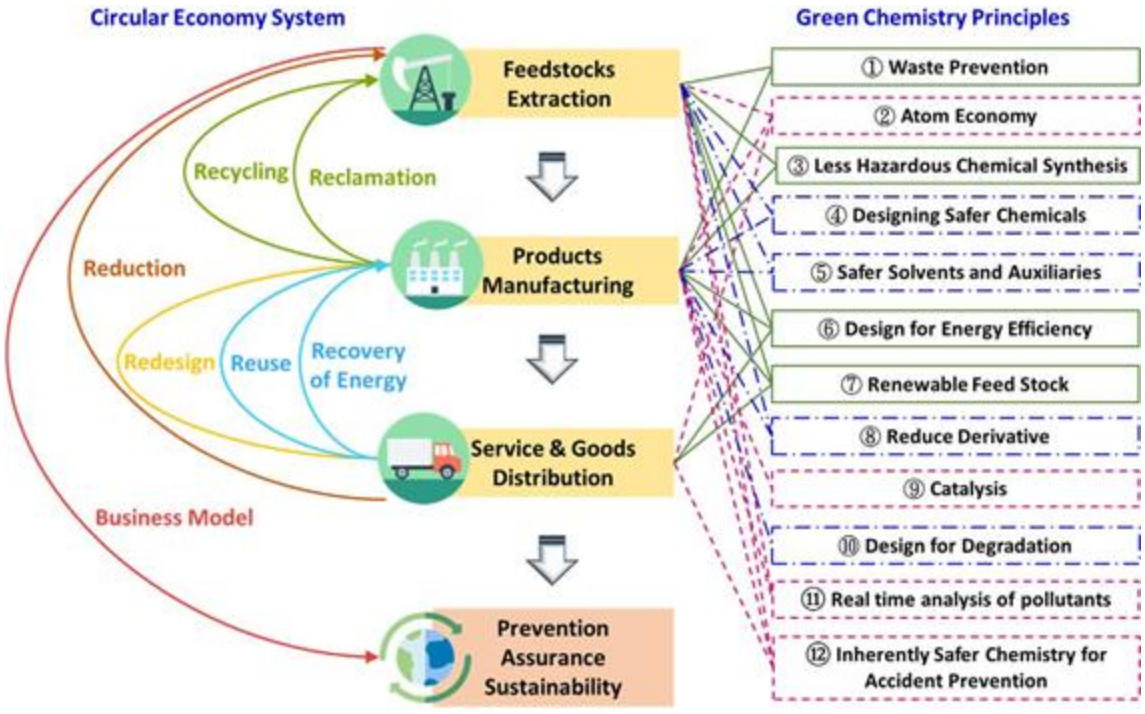
Integrating the GCP into the circular economy concept, five strategies of priority are proposed into the governance direction:

1. Establishment of cross departmental collaboration.
2. Development of cleaner production and green products.
3. Provision of integrated chemical management system.
4. Implementation of green chemistry education program.

5. Construction of a business model.

GCP practice in a circular economy, the strategies of priority governance direction (PGD) could be integrated into (a) cross-departmental collaboration, (b) development of cleaner production technology, (c) establishment of integrated chemical management, (d) implementation of green chemistry education, and (f) construction of a business model and supply
chain

Realistic GCP practice builds a circular economy with a strong connection between producers, manufacturers, consumers, and designers. The following schematic diagram shows GCP within the Circular Economy synthesis.



2.6.3 Circular Economy Principles Linkages to SDGS

The Circular Economy and GCP are intimately linked to SDGs that can benefit human health, the environment, and economic sustainability. These principles may help to achieve and realize

the SDGs by improving human health, clean water, and clean-energy production and consumption.The table below shows the GCP and SDG interlinkages.

The relevant SDGs linked to the benefits of GCP application.

Aspects	Key Factors	Related SDGs
Human Health	Enhanced safety for workers in the chemical industry	SDGs 3, 8 and 12
	Safer chemical products for consumers	SDGs 3 and 12
	Better food security	SDG 2
	Less exposure to toxic substances	SDGs 3, 6,12 and 14
	Less release of hazardous chemical to air	SDGs3,7 and 11
	Less release of hazardous chemicals to water	SDGs 3,6,11 and 14
	More innocuous products into environment	SDGs 2,6,9,12 and 14
Environment	Less harmful to plants and animals	SDGs 12 and 15
	Lower potential for global warming, ozone depletion and smog formation	SDG 11,13 and 14
	Less chemical disruption of ecosystems	SDG 12,14 and 15
	Less use of landfills	SDG 11,12
	Higher chemical yields	SDG 9 and 12
	Fewer synthesis steps	SDG 9 and 12
	Reduction of wastes and lower treatment cost	SDGs 9,11 and 12
	Better performance of final products	SDGs 9 and 12
Economy	Reduced use of petroleum products	SDGs 9, 12, 13
	Reduced footprint of manufacturing plant	SDGs 9,12
	Increase product values	SDGs 9,12
	Improved competitiveness of chemical manufacturers	SDGs 9

2.7 High Potential Sectors for Green Jobs

International debate on global environmental issues has evolved over the last two decades since the adoption of the 1992 Rio Conventions on desertification, climate change, and biodiversity. The development of a larger "environmental economy," as well as the emergence of new economic sectors and services, is being made easier. As a result, demand for jobs requiring new qualifications and skills has risen as well, and other jobs have evolved as a result. The concept of green jobs emphasizes labor market shifts that are directly linked to environmental management and low-carbon development, as well as climate change adaptation, as defined by the United Nations Framework Convention on Climate Change (UNFCCC) (Rio Conventions).

Green jobs are employment created in different sectors of the economy and through related activities that reduce the environmental impact of those sectors and activities, ultimately bringing them down to sustainable levels. This includes "decent" jobs that help to reduce consumption of energy and raw materials, decarbonize the economy, protect and restore ecosystems and biodiversity, and minimize the production of waste and pollution. The gap between total environmental-related employment, total employment in core environmental-related activities, and the number of green (i.e., also decent) jobs aids in the identification of a development path. The high proportion of workers in the informal economy in developed countries is an important factor. When informal jobs are excluded from a working definition of green employment, the number of green jobs is estimated to be very low (Jarvis et al., 2011).

i. Greenhouse gas emissions, raw material use, significant contribution to the economy, and sources of employment and income are among the metrics used to classify sectors with high potential for green jobs (Jarvis et al., 2011). These include:**Energy supply**

More than 2.3 million green jobs have been generated in recent years in the energy supply, especially from renewable energy. Renewable energy sources, on the other hand, only account for 2% of global energy consumption. Wind power employs over 300,000 people; solar photovoltaic employs about 170,000 people; and solar thermal employs over 600,000 people, with a significant portion of these in China. Jobs in the renewable energy sector have increased in countries with active policies to encourage them.

ii. Energy efficiency

Energy efficiency, especially in building and construction, is a promising area for reducing greenhouse gas emissions while also creating employment. In the United States and some European countries, approximately four million direct green jobs focused on improving energy efficiency already exist throughout the economy.

iii. Transport

The globalized economy relies heavily on transportation. Although attempts are being made to reduce the impact of automobiles, public transportation emits less pollutants and creates

more green employment. Railways can be thought of as a source of environmentally friendly jobs in general.

iv. Agriculture

Agriculture remains the world's largest employer, employing 1.3 billion farmers and agricultural employees. Agriculture is both highly vulnerable to and a significant contributor to climate change. It is also a major water user and polluter, as well as a cause of deforestation and biodiversity loss. Small farms need more manpower. Small farms using crop rotation, manuring, natural pesticides, and other sustainable practices can equal the yields of larger, but much more environmentally destructive facilities with the right technological and infrastructure support.

vii. Manufacturing

Iron and steel, aluminum, cement, pulp and paper, and other basic industries and recycling industries account for a large portion of energy and raw material consumption, as well as greenhouse-gas emissions, but just a small portion of global jobs. Recycling is the most effective method for reducing these industries' environmental effects. Secondary steel production, which employs recycled scrap, consumes 40–75 percent less energy than primary steel production and can thus be regarded as a proxy for more environmentally friendly production.In the three countries of Brazil, China, and the United States, recycling in all its forms supports 12 million workers. On the other hand, many current recycling workers, on the other hand, cannot be called environmentally friendly because they pollute the environment, pose health risks, and they are not examples of decent employment.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter describes the methodologies used to conduct the Higher Education Development for Green Economy and Sustainability survey. The baseline survey used a Mixed Method Research Design (MMRD) for data collection where both qualitative and quantitative data were obtained. The tools of data collection have also been highlighted in this section.

3.2 Study Context

This study focused on green economy curricula development for institutions of higher learning, with a case study of Kenyatta University. An interdisciplinary approach was used that guided the sampling of ten schools at Kenyatta University. These schools included: the School of Environmental Studies, School of Business, School of Economics, School of Agriculture and Enterprise Development, School of Engineering, School of Pure and Applied Sciences, School of Public Health, School of Creative Arts, Film and Media Studies, and the School of Humanities and Social Sciences. To link academia and industry on green economy assessment, different intersectoral interviews were conducted.

3.3 Sampling and Sample Size Criteria

Through online questionnaires and focus group discussions with doctoral students at Kenyatta University, the sampling was conducted across ten schools at the university. Semi-structured online interviews were conducted with representatives from various industries. Effective data collection for the baseline was made possible by the use of convenient and targeted sampling techniques.**3.4 Research Tools**

The following research tools were used for the baseline study: structured closed-end questionnaires, focus group discussions, and individual interviews. As a result of the COVID-19 pandemic, it has been determined that the health guidelines necessitate converting from physical to virtual tool administration.

The questionnaires were coded online using the Google Docs platform, which allowed Masters' students to complete the tool using their smart phones and laptops, rather than having to print it out. The staff and student questionnaires were completed by a total of 100

lecturers and 227 master's students, respectively, in this study. Focus Group Discussions were held virtually, with 50 doctoral students from ten different universities taking part in the discussions. Deans from ten different schools were asked to complete ten checklists through email interaction, which was done on purpose.

Interviews with key professionals from industries with target thematic areas in the public and private sectors on the significance of the green economy were conducted on purpose with key professionals from industries with target thematic areas in the public and private sectors. Agriculture, manufacturing, transportation, education, communication, and tourism were all included in this category.

3.4.1 Interview Sessions

The interview sessions were organized in such a way that each sector from the intersectoral nexus that was suspected to have green economy transition pathways was clearly distinguished from the others. The baseline themes, which were driven by objectives, assisted in the identification of professional interviews by sector..

3.5 Methodology limitations

The baseline survey revealed the following limitations, which were either indirectly or directly related to the outcome of the survey: These factors included a lack of project funds, uncertainty surrounding interdisciplinary proposal submissions, and the COVID-19 pandemic.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Gender of respondents

The study involved both male and female genders (Table 1). From the 300 questionnaires targeted, 227 valid answers were collected. Consequently, the response rate was 75.6%. From the total sample (N = 227, 100%), the female respondents fetched (n = 114, 50.2%), which was slightly more than their male counterparts (n = 113, 49.8%).

Table 1: Gender of respondents

Gender	Frequency	Percent
Female	114	50.2
Male	113	49.8
Total	**227**	**100**

4.2 Distribution of schools

The survey involved ten schools at Kenyatta University (Figure 1) with student response variations.

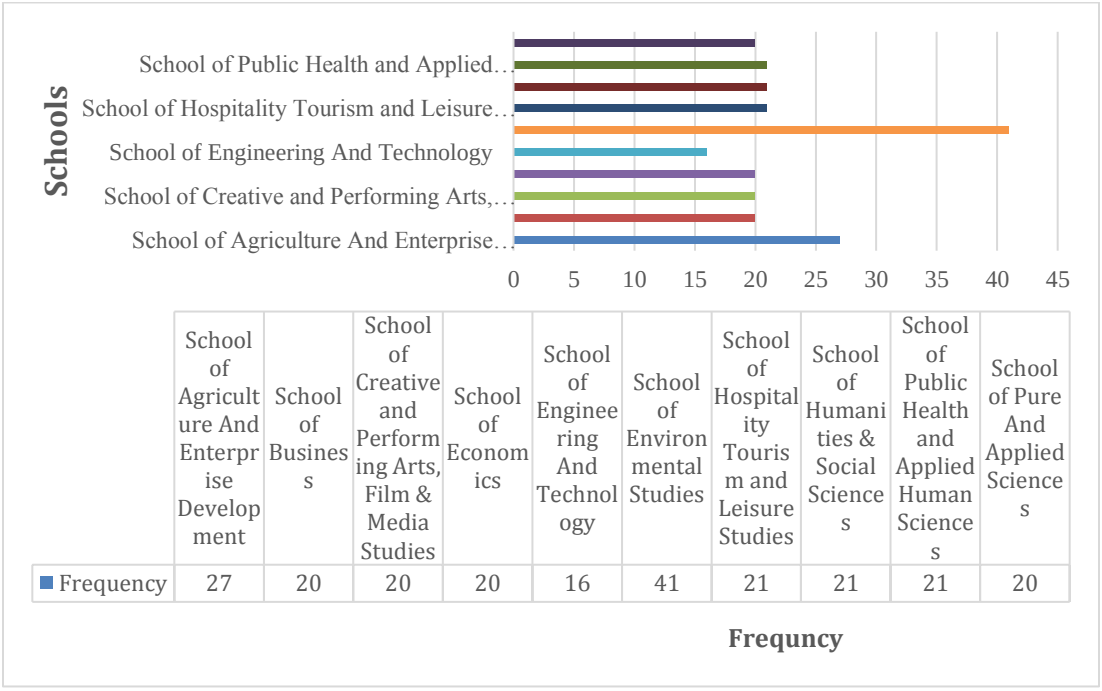
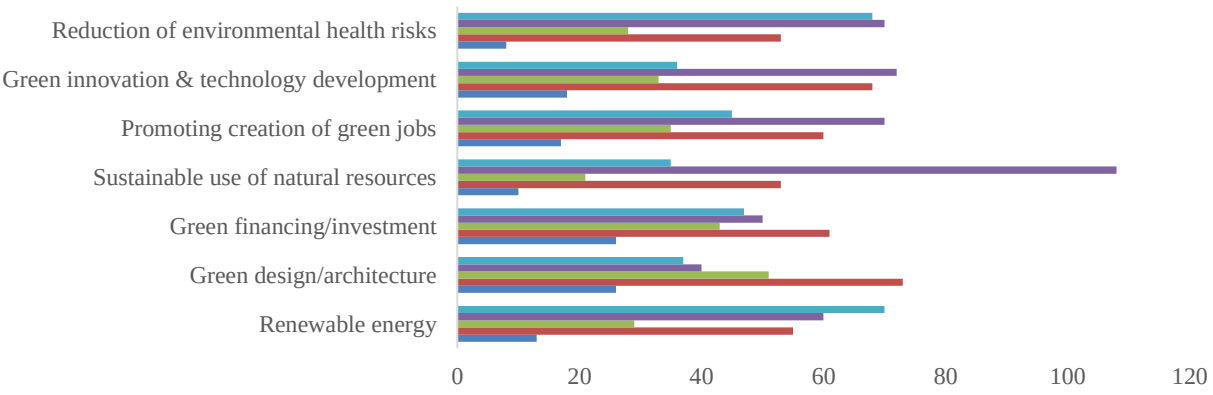


Figure 1: Student participation across ten schools

These schools' respondents' response rates were as follows: School of pure and applied science (n =20), School of public health and applied human sciences (n =21), School of humanities and social science (n =21), School of hospitality, tourism, and leisure studies (n =21), School of engineering and technology (n =16), School of economics (n =20), School of creative and performing arts, film and media studies (n =20), School of business (n =20), and School of agriculture and enterprise development (n =20).

4.3 The extent to which your school provides courses in green economy and sustainability.

Green economy studies have gained center stage globally and domiciling them in academia could transition aspects and minds through curriculum development at higher institutions. The first objective of the study was to examine the extent and format in which green economy and sustainability concepts, issues, and tools are incorporated into the university curriculum and learning programmes. The results of the findings for the objective are discussed below. Different respondents in ten sampled schools indicated the extent to which they had interacted with green studies thematic areas in courses within their disciplines (Figure 2).



	Renewable energy	Green design/architecture	Green financing/investment	Sustainable use of natural resources	Promoting creation of green jobs	Green innovation & technology development	Reduction of environmental health risks
Slightly	70	37	47	35	45	36	68
Significantly	60	40	50	108	70	72	70
None	29	51	43	21	35	33	28
Moderately	55	73	61	53	60	68	53
Don't Know	13	26	26	10	17	18	8

Figure 2: The extent schools offered green economy and sustainability courses

The postgraduate students indicated the extent to which their respective schools provided courses on green economy and sustainability topics. The assessed topics were: green economy, renewable energy, green financing, green innovation and technology development, sustainable use of natural resources, green design or architecture, environmental policy and management (Figure 2 and Table 2).

Table 2 shows a five-point Likert scale that was used to rate the respondents' opinions. The following are relevant topics from postgraduate students across different schools. Green economy (n = 61, 26.9%) was moderate, education for sustainable development (n = 72, 31.7%) was slightly, green design and architecture (n = 73, 32.2%) was moderate, green financing or investment (n = 61, 26.9%) was moderate, and promoting the creation of green jobs (n = 70, 30.8%) was moderate.

Table 2: The extent schools offered green economy and sustainability courses

	Don't Know		Moderately		None		Significantly		Slightly	
Green Economy Topics in Courses	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**N**	**%**
Globalization and Sustainable Development	12	5.3	95	41.9	12	5.3	74	32.6	34	15
Education for Sustainable Development	7	3.1	72	31.7	5	2.2	71	31.3	72	31.7
Green Economy	10	4.4	61	26.9	56	25	45	19.8	55	24.2
Environmental Policy and Management	7	3.1	62	27.3	25	11	70	30.8	63	27.8
Land ethics and sustainable agriculture	10	4.4	58	25.6	45	20	39	17.2	75	33
Urban ecology and social justice	13	5.7	70	30.8	43	19	29	12.8	72	31.7
Environmental philosophy	20	8.8	43	18.9	46	20	41	18.1	77	33.9
Population, women and development	7	3.1	75	33	33	15	57	25.1	55	24.2
Renewable energy	13	5.7	55	24.2	29	13	60	26.4	70	30.8
Green design/architecture	26	11.5	73	32.2	51	23	40	17.6	37	16.3
Green financing/investment	26	11.5	61	26.9	43	19	50	22	47	20.7
Sustainable use of natural resources	10	4.4	53	23.3	21	9.3	108	47.6	35	15.4
Promoting creation of green jobs	17	7.5	60	26.4	35	15	70	30.8	45	19.8
Green innovation & technology development	18	7.9	68	30	33	15	72	31.7	36	15.9
Reduction of environmental health risks	8	3.5	53	23.3	28	12	70	30.8	68	30

4.3.1 Action-oriented green economy learning method

Upscaling green economy skills is integral towards attainment of holistic interdisciplinary learning in academia (Gibbs and Oneill, 2014). Application of green learning was ranked in a five-point scale by postgraduate students in ten schools at Kenyatta University. The learners were assessed to ascertain the extent to which application of action-oriented teaching and learning methods and programmes to address green economy and sustainability. Results from (Figure 3) indicate that, on a scale of five, slightly (n=88, 38.8%), significantly (n=17, 7.5%), none (n=19, 8.4%), moderately (n=84, 37%) and don't know (n=19, 8.4%) respectively. The results indicate that, respondents felt that the existing programs were slightly or moderately addressing green issues at 38.8% and 37% respectively (Figure 3).

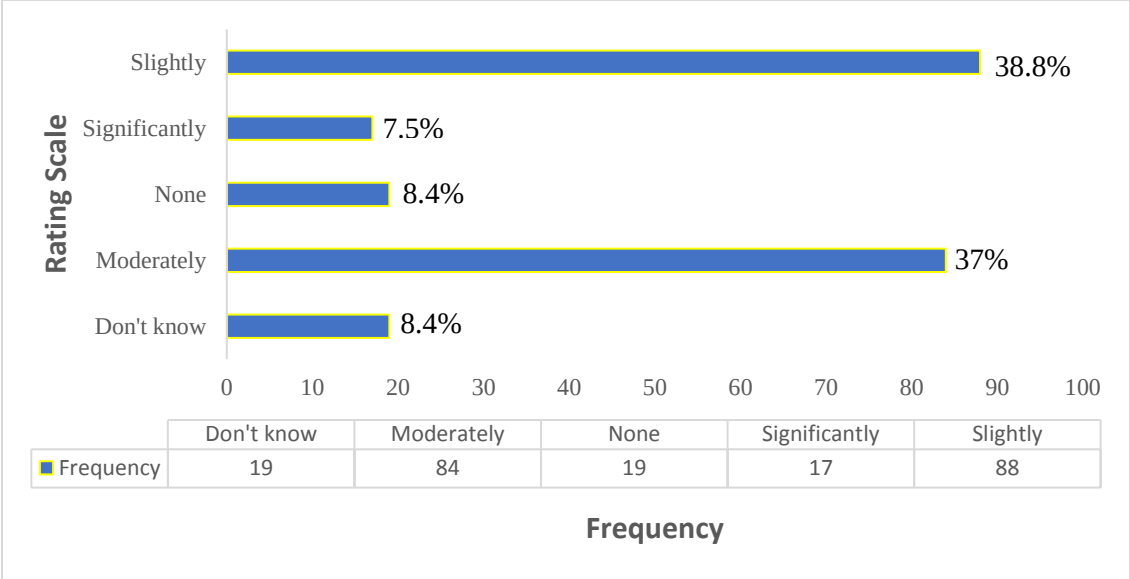


Figure 3: Green economy action learning and sustainability issues

In addition, Table 3 shows three probable appropriate teaching and learning methods for green studies at Kenyatta University. From the respondents (n = 227, 100%), the majority of respondents preferred an action-oriented teaching method (n = 152, 67%). The other teaching and learning methods recorded were holistic teaching and learning methods (n = 68, 30%) and learning through all senses (n = 7, 3.1%) (Table 3). This therefore shows green economy teaching to be embedded more in an action-oriented approach.

Table 3: Preferred green economy and sustainability teaching and learning method

Appropriate Teaching and Learning Method	N	%
Action-oriented teaching and learning method	152	67
Holistic teaching and learning method	68	30
Learning through all senses	7	3.1
Total	**227**	**100**

However, from the findings, actionable green learning needs more upscaling, like the participatory action-oriented study of Green Care in Finland (Moriggi, 2021). More information on the significance of green care practices for processes of place-based sustainability transformations that can be emulated by Kenyan higher education institutions is provided in the study.

4.4 Assessment of green economy and sustainability aspects in coursework

A greener economic learning model is one that is well versed in different academic programs offered to learners. Results in Figure 4 show an examination of green economy aspects in coursework. The masters' students (N = 227) indicated their responses accordingly. From the three choices of response, the majority of the students (n = 147, 64.7%) responded "Yes," the No responses were recorded (n = 59, 26%), and those who didn't know were recorded (n = 21, 9.3%). The results therefore indicated the penetration of green economic and sustainability aspects during course examinations.

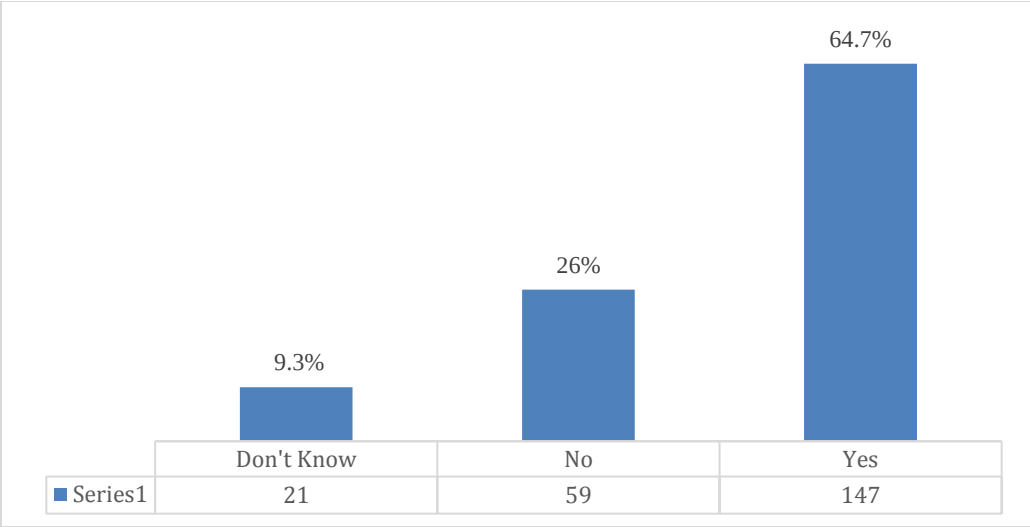


Figure 4. Green economy and sustainability aspects in coursework

The findings agree with Newton *et al.* (2014) that it is widely assumed that new educational curricula are required to provide professionals with the necessary knowledge and abilities to successfully expand the green economy. At the moment, there are just a few institutions of higher learning that are devoted solely to the green economy, owing to its recent beginnings.

4.4.1 Postgraduate students' response on examination green economy aspects per school

Learners tend to respond differently to how they perceive interdisciplinary programs. Green economy learning is an emerging concept on which global higher institutions of learning base their focus. The assessment of the green economy and sustainability per school is shown in Table 4 and Figure 5 respectively. The results show the School of Engineering and Technology leading all other schools with a response rate of n = 15, or 93.8%), followed by the School of

Environmental Studies (n = 36, or 87.8%). The 3rd highest response was from the School of Agriculture and Enterprise Development (n = 20, 74.1%). Other schools had a response rate of above 50%, meaning an above average examination of green economy aspects in exams. However, only two schools had a leading negative (No) response; the school of economics (n = 15, 75%) and the school of pure and applied sciences (n = 12, 60%) (Table 4).

Table 4: Students response on examination green economy aspects per school

	Are green economy and sustainability aspects assessed or examined in theory coursework?			
School	Yes		No	
	n	%	N	%
School of Agriculture and Enterprise Development	20	74.1	7	25.9
School of Business	12	60.0	8	40.0
School of Creative and Performing Arts, Film & Media Studies	14	70.0	6	30.0
School of Economics	5	25.0	15	75.0
School of Engineering and Technology	15	93.8	1	6.3
School of Environmental Studies	36	87.8	5	12.2
School of Hospitality Tourism and Leisure Studies	12	57.1	9	42.9
School of Humanities & Social Sciences	12	57.1	9	42.9
School of Public Health and Applied Human Sciences	13	61.9	8	38.1
School of Pure and Applied Sciences	8	40.0	12	60.0

To check on the significance of the association between school and the students' response to the question, "Are green economy and sustainability aspects assessed or examined in theory coursework?" Table 5, shows a significance index (χ^2= 37.267, df = 9, p = 0.000).Therefore, the students' responses were found to be significant.

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Text Box 1: School of Economics, Creative Arts and Film Technology & Engineering

From these schools, we had a combined discussion, and from the single discussion, the interviews could be seen as a clear representation of the school's position on the conceptualization of green economy and sustainability. The discussions were vast and encrypted in a way that it was not possible to inform the student of the anticipated outcomes of the baseline anticipated research. The contributions were a clear outlook of the schools as represented by the 6 PhD students: 2 from Economics, 3 from Engineering, and 1 from Creative Arts and Film Technology.

The green economy concept was not relevant to the school of economics, but after a rigorous interaction, the students had an idea of what green economy and sustainability were.Initially, they saw green economy as an environmental program that should be run through the School of Environmental Studies.They acknowledged the perspective of the interdisciplinary program and recommended that policies be "greened" in order to address the needs of the economy. It was evident that students from the school of economics were willing to have green economy and sustainability learning incorporated into their curriculum.

In the School of Creative Arts and Film Technology, where we had one student who represented the school, she did acknowledge that they had moved a step and they were applying the concept of green economy and sustainability principles in their media film production. The concept was not new to them, and they had learned about it in a conference proceeding and research related to green film production in their school. She recommended that the concept should be advocated and clear guidelines be provided on how it can be made known and realistic to students through action research and teaching.

In the school of engineering, we had 3 Ph.D. students who came from the department of Energy Technology, where Dr. Elias Ako, who is a partner in the HEDGES project, comes from. The school is aware of the green economy and the importance of sustainability education. They practice the concept through renewable energy technology, learning about energy-saving mechanisms and embracing green research projects that aim at reducing their carbon footprints. The department is actively involved in solar panel projects that are aimed at reducing the amount of money the university pays on its electricity bills. As a result of the interactions, the engineering school was active in conceptualizing green economy and sustainability.

The findings (Text Box 1) clearly show that while green economy is viewed as an environmental aspect, it should be interdisciplinary. This notion affects the learners' interests, yet it is a critical component of sustainability that overarches from green economic practices and growth in academia.

Text Box 2: School of Agriculture and Enterprise Development

From the School of Agriculture and Enterprise Development, we had a team of five PhD students who actively participated in our baseline survey from the three departments in the school. From the interaction of the school of agriculture, the school has adopted the concept of green economy and is applying it to pest control and dryland management. Through the discussion, it was evident that the department of dryland is embracing a green economy through climate-smart agriculture practices. The conceptualization of the green economy concept is still indirectly taken as the school practices it, but not sure of the corpus of the green economy concept in its idealistic meaning.

Based on the interview, the students who participated were aware of the concept and represented the views of the school in general. They acknowledged that the curriculum in their school needs to be greened and that it should be done in joint consultation with the stakeholders from the industry and the management of the university in order to green their curriculum and review the existing one to the standards needed to meet the industry's needs.

The student recommended that it is important to have an interdisciplinary program among the different schools. The program should be aimed at addressing the challenges of course reviews that should be done regularly and also provide an avenue for new outlooks on the relevant technologies and practices that can be adopted to solve the problems in the agricultural sector. In this regard, the students agreed that action research and proper guidance should be provided to students in order for them to pursue relevant research on green economy and sustainability.

The results (Text Box 2) indicate that the green economy still has not been defined well within the interdisciplinary curricular approach. Its aspects should be well espoused in different schools, especially the school of agriculture at Kenyatta University. According to the respondents, green learning and understanding are integral in the agricultural sector to meet industrial needs.

Text Box 3: School of Business

In the school of business, there were nine Ph.D. students who participated in the focused group discussion. The concept of green economy and sustainability was highly recommended since two students were actively involved in green economy-related projects. The concept has taken routes even to their working places as they embrace and recommend green economy curriculum development. Through the establishment of eco-friendly policies and business ideas, the students from the school of business advocated that the university should address the aspect of green economy learning through curriculum development and the introduction of a common university unit on green economy and sustainability learning.
The School of Business clearly showed their committed efforts towards the concept of the green economy through lecturers supervising students on projects and theses that were related to the concept of green economy and sustainability. The school was active in transforming their careers towards meeting the needs of the industry by engaging their students with the relevant industries related to business sustainability learning. Therefore, through the discussion, the students recommended action learning for green economy and sustainability concepts.

From the school of business (Text Box 3), it was evident that the students and lecturers had begun to green their curricula through research. However, the students were more concerned about green transitions that met industrial needs at their work places. A component of green skills that resides in green job opportunities. Therefore, students should engage more in green projects as part of their skills development.

Table 5: Significance of green economy aspects on coursework examination

Pearson Chi-Square Tests		
		Are green economy and sustainability aspects assessed/ examined in theory coursework
School	Chi-square	37.267
	df	9
	Sig.	0.000*

Significance: $p \leq 0.05$

This can be clearly shown on Figure 5 where the respondents where to select a Yes or No per school. Nearly all schools had a positive answer except the school or economic and school of pure and applied science of Kenyatta University

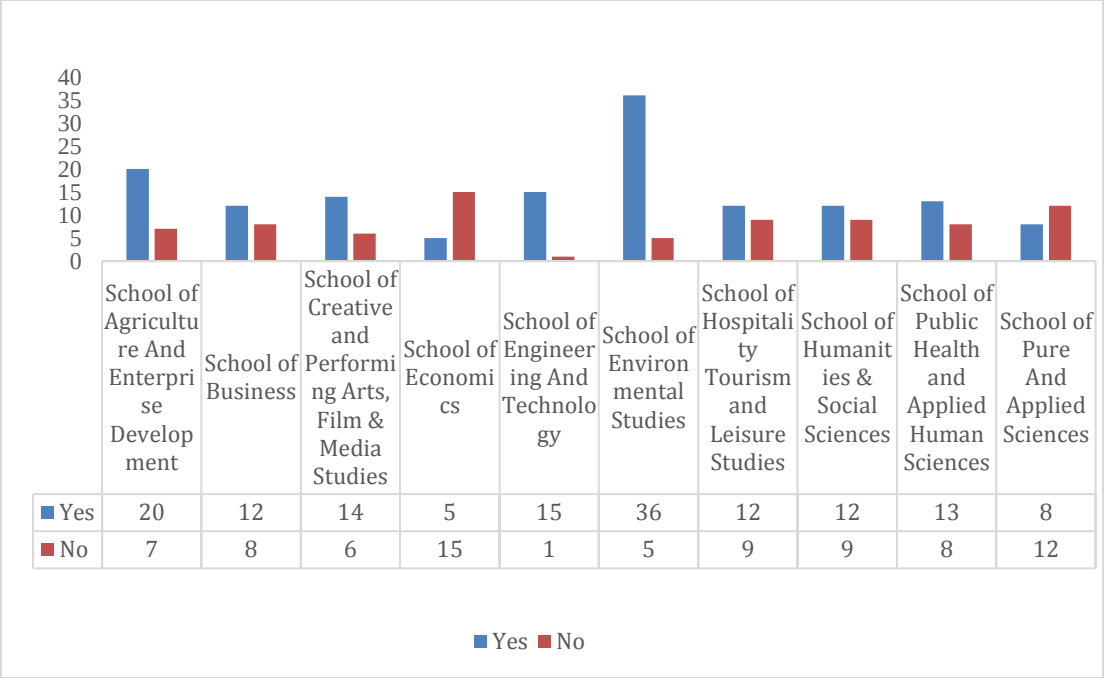


Figure 5: Students response on green economy aspects per school

4.4.2 Kenyatta University Lecturer capacity on green economy studies

Green economy and sustainability delivery necessitates tutor expertise and proper training, specifically for competency and adequate mastery of the curriculum.

Table 6 shows the capacity of lecturers on green economy and sustainability as indicated by respondents (N = 227, 100%). The results show that the majority of respondents (n = 152, 66.7%) felt that Kenyatta University lecturers were competent in green economy studies. However, some felt they were not competent (n = 76, 33.5%) (Table 6).

Table 6: Lecturers have the capacity to teach green economy and sustainability topics

Lecturers have the capacity to teach green economy and sustainability topics		
	n	%
Yes	151	66.5
No	76	33.5
Total	**227**	**100.0**

The lecturer's competence on green economy and sustainability aspects per school is shown in Table 7. The results show that the majority of respondents felt that their lecturers were conversant with green economic studies in their respective schools. Schools with higher lecturer competence were the schools of engineering and technology (n = 14, 87.5%) and the school of agriculture and enterprise development (n = 23, 85.2%) compared to other schools as indicated by the total respondents (N = 227).

Table 7: Lecturer green economy capacity per school

	Lecturers have the capacity to teach green economy and sustainability topics			
School	Yes		No	
	n	%	n	%
School of Agriculture and Enterprise Development	23	85.2	4	14.8
School of Business	13	65.0	7	35.0
School of Creative and Performing Arts, Film & Media Studies	15	75.0	5	25.0
School of Economics	10	50.0	10	50.0
School of Engineering and Technology	14	87.5	2	12.5
School of Environmental Studies	30	73.2	11	26.8
School of Hospitality Tourism and Leisure Studies	11	52.4	10	47.6
School of Humanities & Social Sciences	13	61.9	8	38.1
School of Public Health and Applied Human Sciences	13	61.9	8	38.1
School of Pure and Applied Sciences	9	45.0	11	55.0

Based on the findings, developing green competencies needs curricula structures at learning institutions. A study by Pavlova (2017) on "Greening TVET colleges initiative in South Africa: from individual competence development to institutional change." The green economy has the potential to be a new major hub, a net generator of decent jobs, and a critical method for increasing education and transitioning socioeconomic changes.

Table 8 depicts the importance of lecturer capacity on green economy and sustainability in various schools. From the Pearson chi-square test, lecturers were found to have the capacity to teach green economy related topics (χ^2= 17.763, df = 9, p = 0.038).

Table 8: Significance of lecturers' capacity on green economy and sustainability

Pearson Chi-Square Tests		
		Lecturers have the capacity to teach green economy and sustainability topics
School	Chi-square	17.763
	df	9
	Sig.	0.038*

Significance: $p \leq 0.05$

4.4.3 Perceptions of Lectures on Green Economy & Sustainability at Kenyatta University

To enhance green growth in academia, universities should show commitments that best promote green economies and sustainability opportunities. The commitment should be demonstrated by academic personnel and institutional management.

Results on Table 9 show green aspects and opportunities at Kenyatta Universities as viewed by lecturers (N = 100) at the institution's different schools. From the lecturers' responses, voluntary community service by students related to sustainability issues and concerns (n = 67, 65.7%) of the total (N = 100) was the leading green economy aspect. The second aspect was green career talks and career counselling focused on work in sustainable enterprises (n = 42, 40.78%) of the total responses. Other aspects have less than 30% lecturer responses, thus a concern about how green economy studies are being enhanced at Kenyatta University.

Table 9: Green Aspects and opportunities at Kenyatta University

Aspect	n	%
Student Environmental Center	29	28.16
Ecology House or Sustainable Hostels	15	14.56
Orientation program(s) on green economy & sustainability for students	18	17.48
Student Group(s) with a green economy or sustainability focus	30	29.13
Student Group(s) with a green economy or sustainability focus	20	19.42
Green career talks and career counselling focused on work in sustainable enterprises	42	40.78
Pledge of socio-economic and environmental responsibility	25	24.27
Voluntary community service by students related to sustainability issues and concerns	67	65.05

4.5 Mainstreamed into Green Economy and Sustainability in University Governance, Operations and Outreach

Leveraging the green economy and sustainability at higher institutions of learning needs support from these institutions that aligns with existing institutional policies or action plans.

The second objective of the study was to assess whether green economic and sustainability principles have been mainstreamed into university governance, operations, and outreach. Findings relevant to the objective have been discussed below.

Table 10 depicts the extent to which Kenyatta University student groups are directly involved in green economy and sustainability initiatives.Through the Likert scale, the respondents gave their opinions. Green economy and sustainability were marginally mainstreamed, according to the majority of respondents (n =109, 48.0%), while mainstreaming was moderate (n =73, 32.2%) and significant (n =15, 6.6%). Some respondents (n = 25, 11.0%) were unaware of any mainstreaming of green economy and sustainability, while others (n = 5, 2.2%) implied that nothing was happening.

Table 10: Extent university students are involved in green economy initiatives

	N	%
Don't Know	25	11.0
None	5	2.2
Slightly	109	48.0
Moderately	73	32.2
Significantly	15	6.6
Total	227	100.0

4.5.1 Commitment of Kenyatta University in enhancing green economy

Developing a green economy pathway at an institution of higher learning creates a nexus between industry and academia where green studies propel innovations and implementation of green initiatives (Vargas-Hernández, 2020).

Table 11 shows the extent to which formal written statements describing the purposes and objectives of the units reflect the university's commitment to green economy and sustainability. The results show the institution's commitment to enhancing the green economy was slightly (n = 105, 46.3%), moderate and significant at (n = 72, 31.7%) and (n = 18, 7.9%) respectively, and don't know (n = 32, 14.4%).

Table 11: Commitment of the university on green economy and sustainability in courses

	n	%
Don't Know	32	14.1
Slightly	105	46.3
Moderately	72	31.7
Significantly	18	7.9
Total	227	100.0

The students indicated whether the university was committed to developing a green economy committee at Kenyatta University, as shown in Table 12. The majority of responses indicated that the university is not committed to developing a Green Economy/Sustainability Council or Task Force (n = 163, 71.8%). More respondents, on the other hand, suggested the commitment of the university to develop a Green Economy/Sustainability Coordinator-student or staff member position (n = 119, 52.4%), whereas negative or no responses dominated the aspect of developing a position of Dean of Green Economy/Sustainability programs or Director of Sustainability Programs.

Table 12: Commitment of Kenyatta University in Development of green economy committee

	Yes		No	
	n	%	n	%
Green economy/sustainability Council or Task Force	64	28.2	163	71.8

Green economy/sustainability Coordinator- student or staff member	119	52.4	108	47.6
Dean of Green economy/sustainability programs or Director of Sustainability Programs	80	35.2	147	64.8

Table 13 and Figure 8 show the extent of concern for and commitment to green economy and sustainability in the university given broad visibility. With the aid of a five-point Likert scale, the respondents outlined the visibility of green economy and sustainability in the university as being slight (n = 91, 40.1%), moderate (n = 71, 31.3%), significant (n = 29, 12.8%), don't know (n = 31.7%) and none (n = 5, 2.2%).

Table 13: Visibility of green economy and sustainability in the university

Extent of concern for and commitment to green economy /sustainability given broad visibility in the University		
	n	%
Don't Know	31	13.7
None	5	2.2
Slightly	91	40.1
Moderately	71	31.3
Significantly	29	12.8
Total	227	100.0

Kenyatta University should be part of it. Universities have a role to play in enhancing the green economy. According to the findings by Fissi *et al.* (2021), In two separate ways, universities can play a crucial role in establishing a more sustainable society. On the one hand, decreasing the negative economic, social, and environmental consequences of their activities and, on the other hand, promoting sustainable practice in curricula and research programmes. More precisely, a "green university" incorporates sustainability into all its activities (i.e., institutional framework, campus operations, teaching, research, community engagement, accountability, and reporting).

4.5.2 Kenyatta University Green Economy Strengths

Every higher education institution should prioritize academic strengths that drive green economy aspects as a strength toward environmental sustainability.This builds on green economy principles.

The greatest strengths of Kenyatta University in terms of the green economy and sustainability are shown in Table 14. The respondents indicated that the institution's main strength in terms of green economy was to encourage and support green economy/sustainability research and development (n = 133, 58.6%), recording the most positive responses. Despite negative or no responses dominating the remaining aspects of the green economy, strengths were manifested as follows: Disseminating green economy/sustainability materials to the campus community recorded the most negative responses (n =187, 82.4%); Possessing skilled and competent staff in green economy/sustainability (n =170, 74.9%); Incorporating green economy/sustainability themes in formal written statements (n =166, 73.1%); Organizing events that promote green economy/sustainability (n =131, 57.7%) and providing green economy/sustainability topics in the curriculum (n =114, 50.2%).

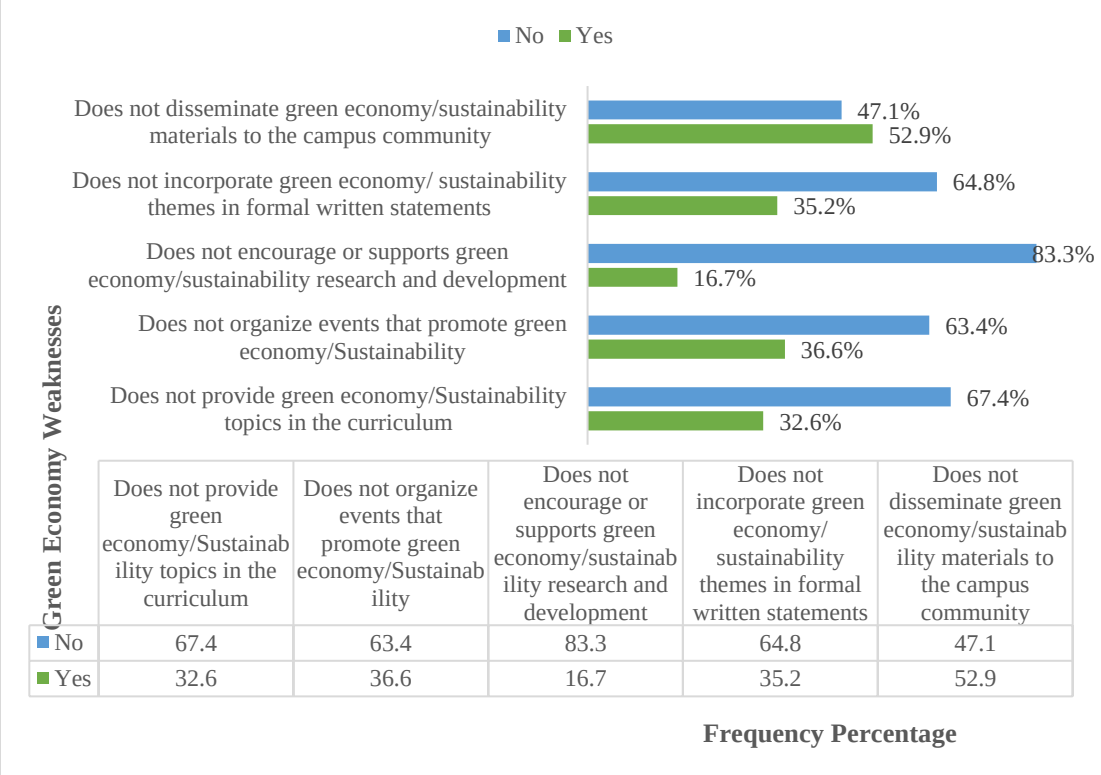
Table 14: Green economy strengths

	Yes		No	
	n	%	n	%
Provides green economy/Sustainability topics in the curriculum	113	49.8	114	50.2
Organizes events that promote green economy/Sustainability	96	42.3	131	57.7
Encourages and supports green economy/sustainability research and development	133	58.6	94	41.4
Incorporates green economy/ sustainability themes in formal written statements	61	26.9	166	73.1
Disseminates green economy/sustainability materials to the campus community	40	17.6	187	82.4
Possess skilled and competent staff in green economy/sustainability	57	25.1	170	74.9

4.5.3 Green economy weaknesses in Kenyatta University

To increase awareness of green economy shortcomings in academia, every institution has to cross-check existing green economy weaknesses.

Figure 6 shows probable green economy weaknesses at Kenyatta University. The results show that the main weakness of the university was not encouraging or supporting green economy/sustainability research and development, receiving the most negative responses (n = 189, 83.3%). The other weaknesses were: does not provide green economy or sustainability topics in the curriculum (n = 153, 67.4%); does not incorporate green economy or sustainability themes in formal written statements (n = 147, 64.8%); does not organize events that promote green economy or sustainability (n = 144, 63.4%). However, from the responses, the university seemed to be working harder towards disseminating green economy/sustainability materials to the campus community, recording more positive than negative responses (n = 120, 52.9%).



	Does not provide green economy/Sustainability topics in the curriculum	Does not organize events that promote green economy/Sustainability	Does not encourage or supports green economy/sustainability research and development	Does not incorporate green economy/ sustainability themes in formal written statements	Does not disseminate green economy/sustainability materials to the campus community
No	67.4	63.4	83.3	64.8	47.1
Yes	32.6	36.6	16.7	35.2	52.9

Figure 6: Green economy weaknesses

Fosse *et al.* (2016) established a SWOT analysis of the green economy concept, which is literally copied as it is well developed. The study found some green economy strengths to be stakeholder engagement and empowerment of local communities, a positive impact on

environmental, economic, and social transformation, and promoting cross-sectoral integration. The noted weaknesses were: no global definition of "green economy" and a lack of full understanding of the financial gains of transitioning to a green economy. Therefore, from the findings, Kenyatta University should prioritize on the noted institution's weaknesses to enhance the green economy model at the institution.

4.6 Institutional Capacities for Greening Curriculum and Competencies for Green Economy Learning and Addressing Sustainability Issues

The third objective of the study was to review the existing institutional capacities required for greening the curriculum and competencies for green economy and sustainability learning. The findings have been laid out below.

4.6.1 Application of Action-Oriented Teaching and Learning in the curriculum in Kenyatta University

As academia advances and new studies are conducted that best suit innovations, job creation, and creating societal solutions towards sustainability, green economic learning should be practical-based and action-oriented. This develops behavioral change that is critical to advanced learning at graduate programs.

Figure 7 depicts the degree to which teaching and learning methods have been employed in greening curriculum and competencies for green economy and sustainability learning in the university. The results show that the majority of the respondents felt that the degree of application was slight (n=88, 38.8%), moderate (n=84, 37%) and significant (n=17, 7.4%). Moreover, a fraction of respondents didn't have any clue (n=19, 8.4%) while an equal fraction of the former concluded that there was no degree of employment of teaching and learning programs (n=19, 8.4%) in greening the curriculum and competencies for green economy and sustainability learning in the institution.

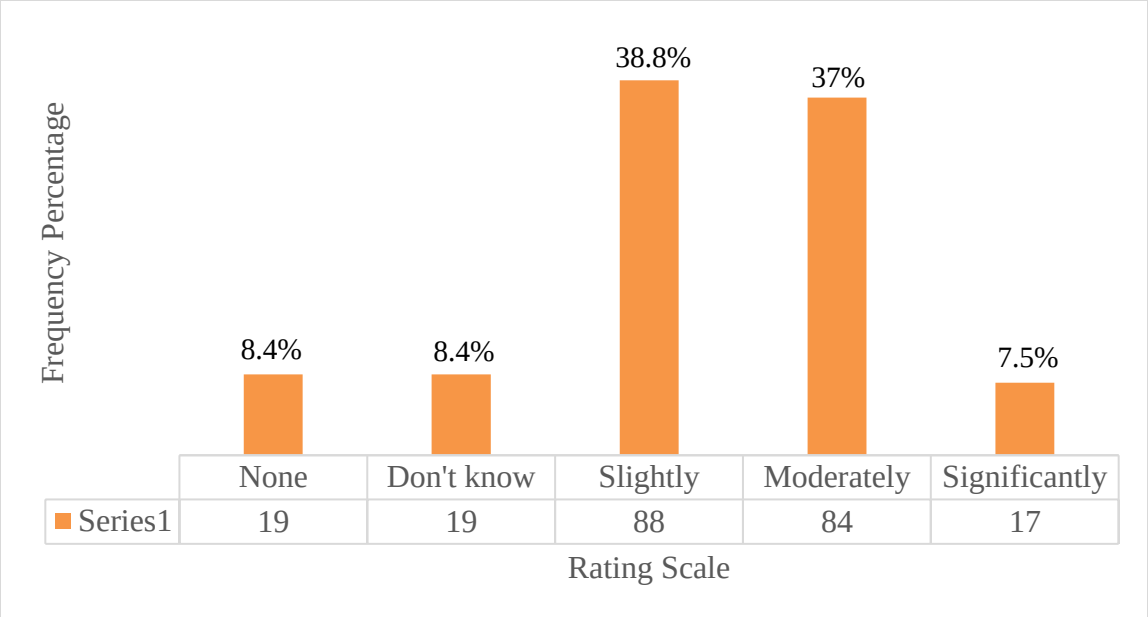


Figure 7: Teaching and learning methods in greening curriculum and competencies

4.6.2: Green economy and sustainability learning weaknesses in Kenyatta University

Table 15 shows the probable weaknesses of the university in greening the curriculum and competencies for green economy and sustainability learning. From the results, the weaknesses were as follows: Does not disseminate green economy or sustainability materials to the campus community (n = 120, 52.9%); does not incorporate green economy or sustainability themes into formal written statements (n = 80, 35.2%); does not organize green economy or sustainability events (n = 83, 36.6%);Does not provide green economy or sustainability topics in the curriculum (n = 74, 32.6%) and does not possess skilled and competent staff in green economy or sustainability (n = 73, 32.2%).

Table 15: Green economy and sustainability learning weaknesses

The Greatest weakness of Your Institution in terms of Green Economy and Sustainability	N	%
Does not provide green economy/Sustainability topics in the curriculum	74	32.6
Does not organize events that promote green economy/Sustainability	83	36.6
Does not encourage or supports green economy/sustainability research and development	38	16.7
Does not incorporate green economy/ sustainability themes in formal written statements	80	35.2
Does not disseminate green economy/sustainability materials to the campus community	120	52.9
Does not possess skilled and competent staff in green economy/sustainability	73	32.2

4.7 Opportunities for strengthening and upscaling the delivery of green economy learning

The 4th objective of the study was to identify opportunities for strengthening and up-scaling the delivery of green economy learning through higher educational institutions. The findings are outlined below (Table 16).

4.7.1 Linkages between Kenyatta University and Industry

To create linkages with industry and academia, creating greater partnerships and collaboration, is important towards skill development for graduands at all levels of academia. Figure 14 and Table 18 show possibilities of linkages the university has with industry for the sake of learners in order to enable learners to engage in gainful employment or entrepreneurship. The majority of the respondents indicated their schools had no active linkages with industry (n = 177, 78%), while some indicated university schools' collaborations, networks, and partnerships with industry (n = 27, 11.9%). This person didn't know that there were linkages between the university and industry had (n = 23, 10.1%).

Table 16: Linkages with industry for learner green job opportunities

Does your school enhance networking, partnership and collaborations with industry to provide green jobs and green entrepreneurship?		
	n	%
Yes	27	11.9
Don't Know	23	10.1
No	177	78.0
Total	227	100.0

From the results, it is evident that academia's collaboration with industry is a big gap in Kenyatta University. This is consequential to green skill development that could transition postgraduate students to green jobs in industry. This can only be driven by academia-industry collaboration. The findings espouse Nyagadza (2021), alluding to those green skills and practices that are advocated for African countries and connected companies to enhance awareness of environmental sustainability.

4.7.2 Industry - Academia Partnerships and Collaboration

Part of Kenyatta University's commitment to championing green economy initiatives is the formation of partnerships and collaboration with relevant industries where green economy aspects are found. From the focus group discussions, the respondents from the targeted industries indicated the following: The key responding actors had this to say:

Agriculture

> *Organizing collaborative training that will enrich the students and the industry on the subject matter through action research (Danish Refugee Council)*

Tourism

> *We are willing to partner with the institutions of higher learning in order to create short courses and provide attachments for student. We can also collaborate through joint training and development of curriculum.*

Communication

> *We have different MOUs with different institutions that we are working with in different projects for example in Kenyatta University we support the Green Week with the guidance of School of Environmental Studies & KNEC (Safaricom).*

Manufacturing/ Processing

We are willing to partner and collaborate with institutions of higher learning where necessary in order to improve on our services especially that we deal with chemicals for preservation of food. We need to have research and collaborative networks to help in finding the solution to our problems in the economy and also support potential research that will yield a positive contribution to our company (Nyaema Limited)

Transport

Proactive approach in providing answers to advancements in technologies that may not have reached Kenya but are happening elsewhere. This would make universities the go to institutions for advisory and consultancy services on key societal issues (GIZ)

Education

We have collaboration and partnerships with different universities and institutions who we do joint research and capacity building workshops with in regard to environmental conservation, green growth practices and circular economy practices. We highly appreciate an effort to embrace green economy and sustainability practices in our economy (KIRDI).

At the moment we are identifying needs of the industry and prioritising to do research that will inform us on the needs and the capacities of the different institutions in relations to implementing the green economy and sustainability learning and research in our new programs. We anticipate that we will do the technical aspect of helping the higher learning institution in executing their key roles in academia and industry partnerships (TVET- KU).

Environment

We are in partnership with institutions of higher learning through collaborative research and action research with different institutions through creating a knowledge hub that will help in creating awareness and jointly developing the teaching curriculum that will address the needs of the industry (Ministry of Environment).

The above academia-industry discourse from different stakeholders alludes that review of the curriculum towards addressing industrial needs is important and key to driving change through a green economy holistic approach. The other concern that emerges is the relevance of research. The other key actors in the industry prefer solution-based research that leverages the green economy through green growth practices and circular economy practices. However, according to Garcia *et al. (*2020), the growing relevance of collaboration between universities and industry over the last two decades has given rise to many worries as to the possible impact of collaboration with companies on academic output. The significance of the university in promoting innovation was generally recognized, and collaboration between universities and industry is a vital mechanism for academic and industrial researchers to share knowledge.

4.7.3 Commitment to green economy and sustainability in Kenyatta University

There is a need for an enabling environment for green economies and an enabling environment that enhances green economy learning in all spaces of academia. Figure 8 depicts the institution's commitment to green economy and sustainability by providing students with

specific opportunities and settings. The strongest areas of commitment from the respondents were: voluntary community service by students related to sustainability issues and concerns (n = 143, 63%) and student groups (s) with a green economy or sustainability focus (n = 102, 44.9%). Despite receiving fewer responses, the following areas demonstrate the university's commitment to green economy and sustainability: Student Environmental Centre (n = 69, 30.4%); Orientation program(s) on green economy and sustainability for students (n = 28, 12.3%); and Ecology House or Sustainable Hostels (n = 27, 11.9%).

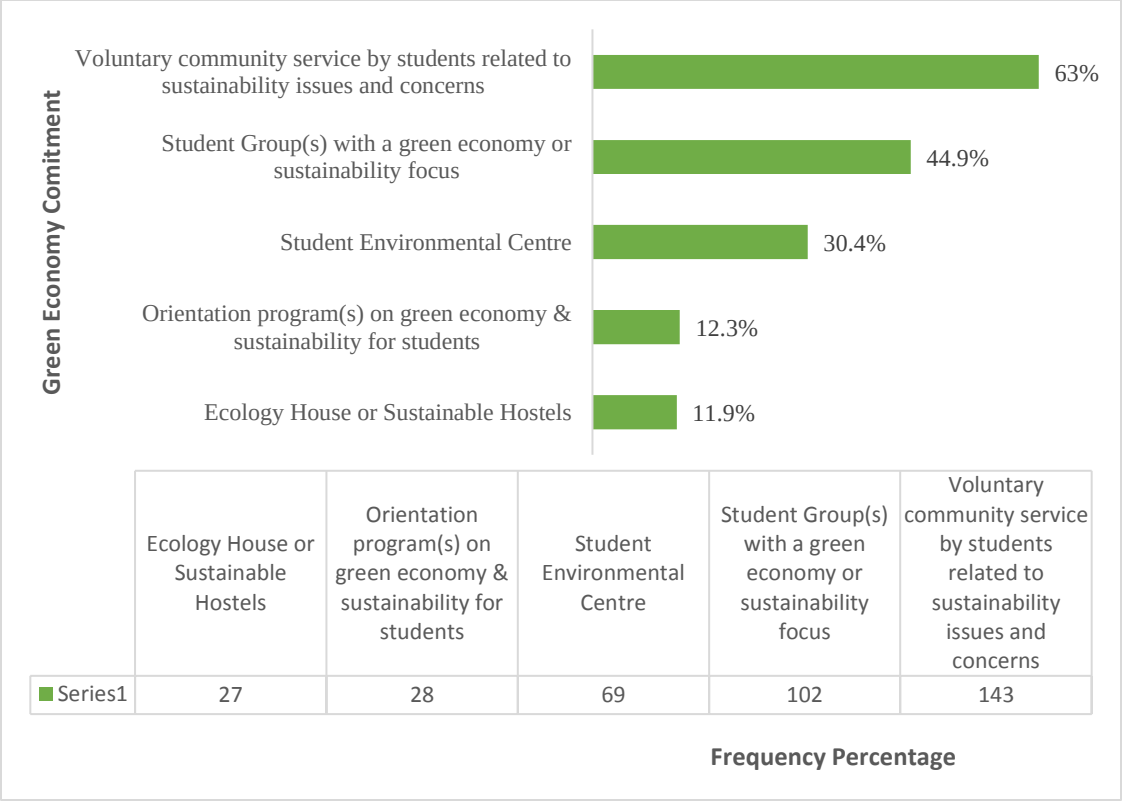


Figure 8: Commitment to green economy and sustainability

The findings support Garcia et al.'s (2020) conclusion that the green economy serves as a medium and facilitator of sustainable development by bridging economic and environmental linkages.In this context, the green economy increases well-being, eliminates social and economic inequalities, and cuts environmental dangers and ecological shortages.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter addresses the summary, conclusions, and recommendations from the HEDGES baseline objectives

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5.2 Summary

This study was guided by four objectives: to examine the extent and format in which green economy and sustainability concepts, issues, and tools are incorporated into the university curriculum and learning programmes; to assess whether green economy and sustainability principles have been mainstreamed into university governance, operations, and outreach; to review existing institutional capacities required for greening curriculum and competencies for green economy and sustainability learning; and to identify opportunities for strengthening and up-scaling the delivery of green economy learning through higher educational institutions.

The first objective of the study examined the extent and format in which green economy and sustainability concepts, issues, and tools are incorporated into the university curriculum and learning programs. The findings indicate that green economy courses were moderately offered across the ten sampled schools at Kenyatta University. To ascertain the action-oriented green economy learning method, the learner ranked it as slightly effective at the institution. When assessing green economy aspects in coursework, the majority of post-graduate students discovered it to be present with penetration of green economy and sustainability aspects during coursework examinations. Ascertaining the competency of lecturers on green economy studies, the majority of respondents found their lecturers to be competent and conversant about green economy learning.

The second objective of the study was to assess whether green economy and sustainability principles have been mainstreamed into university governance, operations, and outreach at Kenyatta University. From the findings, the majority of the postgraduate students were involved in green initiatives sponsored by the university. Despite the fact that some respondents claimed that nothing was happening in terms of green initiatives, some respondents ranked Kenyatta University's commitment towards green economy courses slightly lower. However, a majority of students indicated the university is not committed to

developing a Green Economy Council or Task Force. The majority of respondents at Kenyatta University ranked it slightly higher. To determine the university's strengths and weaknesses in green economy, students indicated that the university has made significant efforts in green research. In addition, the major weakness indicated was the university's lack of incorporation of green economy or sustainability themes into formal written statements.

The third objective of the study was to review the existing institutional capacities required for greening the curriculum and competencies for green economy and sustainability learning. The findings found that teaching of green economy methods and competencies was slightly being employed as indicated by the majority of the respondents, with a moderate response. Looking at green economy weaknesses in sustainability learning, a majority of the respondents indicated that dissemination of green economy materials was not emphasized on campus.

Finally, the fourth objective of the study was to identify opportunities for strengthening and up-scaling the delivery of green economy learning through higher educational institutions. The learners responded well to the linkages between Kenyatta University and the industry. In contrast to the majority, a number of schools at the institution had not initiated proper linkages for learners to leverage gainful apprenticeships for meaningful green jobs. However, some learners indicated the existence of partnerships and collaborations between Kenyatta University and the industry. On whether the schools of Kenyatta University enhance collaborations and partnerships to provide green jobs and entrepreneurship skills, the majority of learners negated it, while some indicated they are not aware of it.

5.3 Conclusion

Green economy learning has yet to be fully entrenched within existing curricula at advanced higher education institutions, with only a few aspects of green economy being taught. This obviously demonstrates that the action-oriented learning approach is not being completely applied within the curricula. Green economy learning should shift from lecturers' knowledge to a competency-based learning strategy that postgraduate studies can tap into through an interdisciplinary approach that best supports green economy and sustainability across all fields of academia.

Even with lecturer and student attempts to house green economy components at institutions of higher learning, institutional support from management, administration, and implementation is required to map green economic infrastructure that leverages research, financing, and leadership inclusivity. In order to survive in academics and its links to business, a green economy must be inclusive. As a result, university administration should take the lead and develop sustainable green learning processes in institutions. Finally, it is critical for institutions of higher learning to create an atmosphere in which green economy studies can flourish by capitalizing on opportunities with the help of industry, where research findings inform their operations.

5.4 Recommendations

1. Higher institutions to develop interdisciplinary curriculum programs or courses that best custom green economy learning to learners.
2. Develop appropriate green economy learning media driven by Artificial Intelligence (AI) where learners and other interested green economy stakeholders can interact and learn emerging green economy aspects. This can be through computer algorithms and automated software hosted my computers and smartphones.
3. Creation of academia-industry sustainable collaborations that espouse research industrial needs driven by academia.
4. More emphasis on competence-based learning of green economy aspects through industrial training, apprentice and attachments.
5. Creation of a sustainability institute at Kenyatta University that shall catalyze technical green learning skills, innovations and prototypes. This will be used as institutional sustainability test bed – The living Lab.
6. Foster transdisciplinary sustainability education on Green Studies that inculcates the impetus for institutional change with inclusivity of various institutional stakeholders and loci of activity.
7. Develop a critical self-and social-consciousness and the ability to engage in educational and community praxis by developing broad content knowledge, authentic and empathic connections with diverse nature, inspiration, commitment, and foresight in Green Studies.

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APPENDICES