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“Developing VET Entrepreneurial Green Mindset and skills for Small-Business Development”

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Table of Contents

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The Project team consists of:

Eduforma, Italy	Dr Dario Dessanai (Project Manager/Coordinator)
	Dr Davide Destro
European Knowledge Spot, Greece	Dr Konstantina Kostami, Regina Kalodiki
Prizma, Slovenia	Ms Mateja Karničnik, Ms Tatjana Pavlič
Nigeria	Mr Oludare Akinlaya, Ms Ebere Ojadua, Ms Gift Uzoma
Kenya	Mr Eric Bosire and Mr George Masuri
SADRAT Institute South Africa	Dr Randall Jonas and Mr Gerhard Lück

Data Analyst/Statistician: Emeritus Professor Philip Serumaga- zake

Language editing: Ms Shena Lamb-du Plessis; **Translation:** Ms Janè De Wet

This report was designed and drafted by Senior Researcher Dr Randall Jonas with assistance from Gerhard Lück from SADRAT Institute. Dr Randall Jonas also

provided guidance for the research process to our African partners from Kenya and Nigeria and the broader project team.

Disclaimer

The SADRAT Institute prepared this report in partnership with Prizma-Slovenia, Eugenec Foundation Nigeria, Yadaversity Nigeria, Center for Digital Skill Acquisition for Women and Youth in Africa Nigeria and Ùstadi Kenya using external sources, systems, and other information we believe to be accurate, complete and reliable at the time of preparation. However, the accuracy and completeness cannot be guaranteed and we make no representation or warranty, express or implied, as to

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Annexures

Annexure A: Statistical Analysis Full Report South Africa

Annexure B: Statistical Analysis Full Report Kenya

Annexure C: Statistical Analysis Full Report Nigeria

Annexure D: Statistical Analysis Full Combined Report

List of Figures and Tables

Tables

List of Definitions

1. **A green economy** is an economy that aims at reducing environmental risks and ecological scarcities, and that aims for sustainable development without degrading the environment. The United Nations Environment Programme (UNEP 2011) has defined a green economy as one which results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.
2. **A green society** is a society that emerges from a green economy and highlights the social dimensions of economic activities.

3. **Green skills** are the knowledge, abilities, values, and attitudes needed to live in, develop and support a sustainable and resource-efficient society. Green skills include the technical skills, knowledge, values, and attitudes needed in the workforce to develop and support sustainable social, economic, and environmental outcomes in business, industry, and the community.
4. **Green entrepreneurship** refers to a special subset of entrepreneurship that aims at creating and implementing solutions to environmental problems and to promote social change so that the environment is not harmed (Saari and Joensuu-Salo, 2019)1
5. **Social economic dimensions** refer to pervasive societal phenomena such as unemployment, inequality, and poverty.
6. **Entrepreneurship** is defined as a transversal competence, which applies to all spheres of life: from nurturing personal development, actively participating in society, (re)entering the job market as an employee or as a self-employed person, to starting up ventures (cultural, social, or commercial). As used in this report, the word builds on a broad definition of entrepreneurship that hinges on the creation of cultural, social, or economic value and implies different types of entrepreneurships, including intrapreneurship, social entrepreneurship, green entrepreneurship, and digital entrepreneurship.
7. The term **"skills"** is used throughout this report to refer to the knowledge, competence and experience needed to perform a specific task or job. A "skill" is the ability to carry out a manual or mental activity, acquired through learning and practice.
8. **Small and medium enterprises** are independent businesses that maintain revenues, assets, or employees below a certain threshold.
9. **Technical and Vocational Education and Training** refers to all forms and levels of education and training which provide knowledge and skills related to occupations in various sectors of economic and social life through formal, non-formal and informal learning methods in both school-based and work-based learning contexts.

Acronyms

DEI - Diversity, Equity, and Inclusivity

DFFE - Department of Forestry, Fisheries, and the Environment

EEVT - Entrepreneurship Education and Vocational Training

Entrecomp - Entrepreneurship Competence Framework

ESD - Education for Sustainable Development

ESDG - Education for Sustainable Development Goals

ESG - Environment, Social and Governance

ESSP - Environmental Sector Skills Plan

GEM - Global Entrepreneurship Monitor

JET - Just Energy Transition

KNBS - Kenya National Bureau of Statistics

MDG - Millenium Development Goals

NEMA - National Environment and Management Authority

PAGE - Partnership Action for a Green Economy

SAQA - South African Qualifications Authority

SDG - Sustainable Development Goals

SEDA - Small Enterprise Development Agency

SETA - Sector Education and Training Authority

SME - Small and Medium Enterprise

SSA - Sub-Saharan Africa

TVET - Technical and Vocational Education and Training

VET - Vocational Education and Training

WEF - World Economic Forum

Executive summary

This report highlights the skills demand for a green economy in the Sub-Saharan African countries of South Africa, Kenya, and Nigeria. Following the priorities presented by the European Commission with the European Green Deal, the present report aims at showing how similarities and common issues can be tackled simultaneously both by European and Sub-Saharan African Countries. Emphasising the importance of entrepreneurial skills and the role of Small and Medium Enterprises (SMEs), the study analysed the status of Technical and Vocational and Educational Training (TVET), entrepreneurial green mindset and green skills for small business development. The European Institutions recognise the importance of SMEs as engines for a full transition to a green and sustainable economy since, in both areas (EU and Sub-Saharan Countries), SMEs represent the core of the economic growth

and GDP production. Without a complete upskilling in green knowledge and practises it will be impossible to reach the 2050 Paris Agreement Goals. Therefore, the GSMESKILL project looks forward to identifying green skills and mindset shortage and through an innovative VET methodology try to address the skills gap in the SSA labour market, with the aim of better bridging the Vocational and Educational context with a more green, sustainable and innovative job market.

Two methods of data collection were used, namely, desk research of existing studies (secondary analysis) for each country and field research (primary analysis) where questionnaires were administered to SMEs and TVETs in each country. All the TVETs and SMEs were requested to participate. The research method was quantitative and 64 participants comprising TVETs and SMEs across the national spectrum of the three SSA countries completed the electronic questionnaire.

Although the study was small, non-participation was not systematic or in any pattern and so should not bias the results. However, this is a limitation, and it is suggested that another study with a larger sample be undertaken. The questionnaire data was exported to an excel spreadsheet and a quantitative analysis was done using IBM SPSS Statistics Software. The findings were compiled for each participating country with a consolidated report with comparisons. Results were presented in tabular format with narratives.

The results clearly showed that 21st century core and contextual skills are essential green skills for SMEs. In addition, knowledge areas such as environmental accountability, waste management, conservation, recycling, and renewable energy were found to be important in developing green skills. Two fundamental components of green skills development are high level technical and high-level analytical skills. Collaboration, communication, networking, creativity, initiative, leadership, and social influence are highly relevant in developing participation in the green economy. A key finding was the poor quality of green skills among SMEs. Adverse findings of inadequate environmental skills planning in surveyed countries as well as an irrelevant and non-responsive curriculum. The overall findings were consistent with the literature that highlighted the dearth of skills development and human capital.

The study recommends a more focused and adequate approach to environmental skills planning be instituted, collaboration between employers and TVETs in respect of skills development, removing barriers such as lack of resources, planned reskilling for green jobs, and addressing the problem of poorly trained educators. Furthermore, curriculum renewal and alignment with education for sustainable development as well-effective awareness campaigns for green skills are crucial interventions in developing the skills and capacities of SMEs in a green economy.

Chapter 1 Introduction

Economic activity pervades all levels of society, and is a complex system of interrelated production, consumption, and exchange activities that ultimately determines how resources are allocated among all the participants. Consumption is the act of using resources to satisfy prevailing needs and wants.[1] Current conventional economic models of production are largely based on the industrial-military complex of manufacturing and production, for example, in the post-war era, the automotive, metal, steel and construction industries became more dominant. However, innovation has played a significant role in bringing about change in the economy and industries as the economy has been driven by coal-fossil fuels and carbon emissions soon impacted the atmosphere and climate change forced a rethink. Since the last century the impact of innovations has intensified climate change to the extent that a green alternative to an extractive economy must be

[1] Retrieved from https://en.wikipedia.org/wiki/Consumptions (economics)

sought and it has become clear that a rethinking of the economy must embrace the 21st century, real-world challenges. This need for a greener, more sustainable economy has now emerged in the postulates of leading economists: summarising the *Rethinking Macroeconomics* project in the *Oxford Review of Economic Policy*, Oxford economists Professor David Vines and Dr Samuel Wills call for a shift away from the assumptions which have underpinned economic theory for decades. They argue that a more open, more diverse, paradigm is emerging, which is far better equipped to deal with contemporary challenges such as the global financial crisis, climate change and COVID.[2] Climate action has become the clarion call for a net-zero economy or decarbonization by reducing harmful emissions by shifting to renewable energy. A net- zero economy requires moving away from fossil fuels and the drive towards renewable energy sources (green alternatives). The call for a green economy and a green society has consistently become more pervasive and in 2015, the Paris Agreement produced a pledge to reduce rising global temperatures. The need to transition to more environmentally sustainable modes of production and consumption is now imperative for developed and developing countries.

This transition means the greening of society and of the economy and the development of green skills. Green skills are the knowledge, abilities, values, and attitudes needed to live in, develop and support a sustainable and resource-efficient society.[3] Education and training are crucial agents of change and play a pivotal role in promoting climate action. Not only does education provide knowledge about the impacts of the climate crisis, but it also empowers people with skills, values, and attitudes to bring about change. The importance of education and training to address climate change is evident in the UN Framework Convention on Climate Change (UNFCCC) which assigns responsibility to Parties of the Convention (COP) to educate, empower and engage all stakeholders and major groups on policies and actions relating to climate change.[3]

The GSMESKILL Project, co-founded by the European Education and Culture Executive Agency (EACEA), aims to reinforce the links between Nigeria, Kenya and South Africa to the Programme VET system and its labour market to better align VET to local labour market opportunities, to increase capacities of VET providers and teachers especially in the fields of management, governance, inclusion, quality assurance, innovation, and internationalisation, to improve the level of competences, skills and employability potential of VET learners, to improve the knowledge, technical, managerial and pedagogical skills of VET teachers and trainers and to

[2] Vines, D. & Wills, S. (2018). The rebuilding macroeconomic theory project: an analytical assessment. *Oxford Review of Economic Policy*, (34), 1-2, Spring-Summer 2018, pp. 1–42.

[3] Retrieved from https://www.unido.org/stories/what-are-green-skills

support the exposure of staff and policy makers bringing the labour market and VET closer. This project enables the exchange of good practices, experiences, and tools to access digital and up-to-date training as well as successful entrepreneurship considering climate-change challenges and the need for green sustainability thanks to an international partnership able to gather together both SSA and European VET centres, NGOs active in the field of entrepreneurship and SMEs operating in the support of start-ups. The capacity of TVET providers and teachers is limited and does not combine technical qualification and industry experience. Competencies of TVET teachers need to answer and adapt to the labour market. Thus, VET teachers often need to cope with a range of learning needs and student expectations in their classrooms for which they have not received adequate preparation. The Education 2030 framework promotes technical and vocational education and training (TVET) systems to increase the number of young people and adults with the technical and vocational skills needed for employment, decent work, and entrepreneurship through the development of relevant skills that respond to labor market demand and socio-economic development needs.

The African Union's (AU) Continental Strategy for Education for Africa (CESA 16-25) calls for a collective effort by all partners to address the challenges related to technical and vocational education and training and lifelong learning. One of the most important developments in the sector of TVET in recent years is a paradigm shift that favours the adoption of a more holistic approach which recognizes skills acquisition in all types of training, be it formal, informal, or non-formal. However, whilst some countries report significant and formalised employer involvement in the TVET system, others can demonstrate little in this regard. Moreover, the evidence suggests that employers are typically more engaged at the national level than at the local level. Demand-oriented training does not only mean matching training quantitatively with demand, but also means qualitatively matching training to industry demand, that is, according to current occupational standards and/or curricula. Demand-oriented training also depends on the quality of the teaching-learning process and is strongly influenced by the quality of teaching staff and whether students can practise the required skills in a real or simulated work environment. Existing teaching systems tend to provide pre-service training, or the preparation of VET teachers like that received by their counterparts across the wider field of teaching (UNESCO, 2006, UNESCO, 2012, UNESCO, 2013). However, internationally, evidence suggests that providing workplace exposure for teaching staff at VET institutions helps to bring the classroom curriculum into closer alignment with the skills needed by industry, motivates the lecturers, and generally promotes long-term cooperation between college and company.

This study comprises quantitative, evidence-based research and mapping of skills and good practices. The research question was: What is the nature and extent of the essential skills in Sub-Saharan African (SSA) countries, namely, South Africa, Kenya, and Nigeria which can support innovation, design-thinking, and greening in small and medium-scale enterprises? The primary research study aimed to identify essential green skills for SMEs and to identify existing entrepreneurial green skills.

Additional aims were to analyse the factors impacting a green economy, to identify the barriers to the development of green skills, analyse the factors impacting a green economy, and to assess the responsiveness and readiness of TVETs in green skills for SME development. As mentioned, the small size of the study sample in the three countries placed limitations on the study as the sample was not representative and only covered three countries in SSA. No generalisations can be inferred from the study and due to the breadth and depth of information on the green economy in each country, it has not been possible to include every detail.

The Report begins with a literature review consisting of existing studies relevant to developing TVET entrepreneurial green mindset and skills for Small Business Development and includes an analysis of the skills demand for a green economy. Chapter 3 presents an analysis of entrepreneurial green skills in SSA countries and Chapter 4 outlines the research methodology. In Chapter 5 the main findings are explained for each country separately and a section on a comparative analysis concludes the chapter. Chapters 6 and 7 contain the discussion and conclusions with recommendations made in Chapter 8. References are provided in the final section of the Report.

Chapter 2 Literature Review

The purpose of this chapter is to give a brief overview of existing literature relevant to developing TVET entrepreneurial green mindsets and skills for Small Business Development in three Sub-Saharan Africa countries namely South Africa, Nigeria, and Kenya. The emergence of a green society and green economy and the concomitant factors of education and entrepreneurship are briefly outlined. A more in-depth analysis of the skills demand for a green economy and various factors are presented in Chapter 3.

The Entrecomp Framework asserts that developing a “sense of initiative and entrepreneurship is one of the eight key competences necessary for a knowledge-

based society".[4] Joseph Schumpeter's concept of entrepreneurship as "creative destruction" implies economic transformation correlated with notions of innovation and risk taking. Entrepreneurial behaviour is manifested in various types and sizes of organisations: in SMEs, in large and new firms as well as in volunteer and charity organisations. Entrepreneurship is also variously and severally viewed as the engine for economic development, irrespective of a country's level of development. Theorising green skills for SMEs entails an analysis of the relations between environmental regulation and the demand for skills. Also, climate change has become the catalyst for environmental regulation and sustainable development. However, there is a tension between the protection of the environment and economic development. An analysis of environmental regulation and enterprise behaviour exposes negative perceptions about freedom, increased costs, and reduced profits. However, environmental regulation can also stimulate innovation, improve resource utilisation, and boost competitiveness. Therefore, sustainable social and economic development may have a positive impact such as maximising profits, technical innovation, and competitive behaviours.[5] Furthermore, the green economy or green society concept implies structural changes in employment and occupations as well as business re-engineering which can generate longer-term benefits.

Thus, the changing nature of work and work organisation and sustainability transitions are closely related. Sustainability, innovation, and the entrepreneurial mindset are core dimensions of green SME skills. Yet, education and training provision do not always synchronise with the supply of commensurate green skills. Education for Sustainable Development (ESD) is a way of linking education with sustainable development. New learning and education pathways within an ESD paradigm enable holistic, systemic, connective, and ecological ways of thinking and learning.[6] The key concepts and theories are sustainability, sustainable development, circularity, ESD, green economy, green jobs, green skills, and resource resilience.

The interrelatedness of environmental regulation and policy making and the demand for skills is central to conceptualising the green economy, green jobs, and green skills. The demand for green skills is closely related to environmental regulation.

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[4] Bacigalupo, M., Kampylis, P., Punie, Y., & Van den Brande, G. (2016). *EntreComp: The Entrepreneurship Competence Framework.* Luxembourg.

[5] Lei Pang & Chen xiaolei (2020). *Theoretical Analysis of Environmental Regulation and Enterprise Behaviour*. IOP Conf. Ser.: Earth Environ. Sci. 531 012017.

[6] Pavlova, M. & Chen, C.-S. (2019). *Facilitating the development of students' generic green skills in TVET: an ESD pedagogical mode.* In TVET@Asia, issue 12, 1-23.

Environmental regulation, conservation, renewables, and waste management impact the nature of work with consequences for technology and organisations. The greening of economic activity is thus a major determinant of the changing nature of work, shifts in job content and job tasks and the emergence of green occupations. To observe the change in the structure of a job or occupation, it is important to understand what new tasks or new content of work are to be classified as a green skill or competence. These dimensions also have theoretical and practical components. Apart from ecological aspects, the social and economic dimensions evolved as major factors in the just transition to a green society. Moreover, the intensification of global competition between countries also has an impact on skills demand. A scarcity of green skills and evidence of an unresponsive education and training system worsen the critical skills crisis.

2.1 Green economy

The notion of a green economy took centerstage at the 2012 United Nations Conference on Sustainable Development (UNCSD) which aspired to set a pathway for sustainable development. The conference, which took place in Rio de Janeiro in June 2012 and aimed at reconciling the economic and environmental goals of the global community, adopted groundbreaking green policies and released a document entitled: '*The Future We Want: Outcome document of the United Nations Conference on Sustainable Development, Rio de Janeiro, Brazil, June 2012*'. The document expounds measurable targets for sustainable development in the form of Sustainable Development Goals (SDGs).[7] The principal concepts in a green economy or green society are sustainability and sustainable development. Although the focus in this report is on the green economy and the emerging skills demand, the social dimensions of the green society are equally relevant and require incorporation in the conceptualisation of this research domain which entails determining whether social challenges like equity, poverty reduction and inclusivity are compatible with policies and transition pathways currently adopted in the SSA countries.[8]

The impact of economic activities and industrial manufacturing on the environment have resulted in economic transformation and a transition to a green economy which mitigates the adverse and detrimental effects on climate and environment. The import of the concept of sustainable development is not merely ecological in its significance, but also has notable socio-economic elements. The United Nations Environment

[7] EXPAT Report 2020-2021, retrieved from https://en.wikipedia.org/wiki/United Nations Conference on Sustainable Development

[8] Cook, S, Smith, K., & Utting, P. (2012). *Green economy or green society? Contestation and policies for a fair transition*, UNRISD Occasional Paper: Social Dimensions of Green Economy and Sustainable Development, No. 10.

Programme (UNEP, 2011) views the greening of the economy as an engine of growth and defined this approach in terms of its dual effects on improved human well-being and social equity as well as "reducing environmental risks and ecological scarcities."

Conceptualising a green economy and how it is guided by policy and regulations has implications for implementation as power relations, governance issues, consultation and participation can pose obstacles for social aspects such as poverty, inclusivity, and equity. It is thus crucial that the state, business, civil society, communities, and individuals are active, empowered, and accountable in bringing about change for sustainable development.

The Brundtland Commission Report (1987)[9] defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This definition combines economic development, social welfare, and environmental protection; and provides the building blocks for developing the concept of the green economy. Additionally, the Pearce Report encourages debates around the interdependence of economic growth and environment.[10]

In its report, From Green Economies to Green Societies, UNESCO (2011) identified five priority areas for a transition to a green economy namely education, science, culture, information, and oceans. Education is acknowledged as "the most powerful weapon to fight poverty and inequality [which] … can foster the attitudes and behaviours necessary for a new culture of sustainability". The importance of education for sustainability was also a key finding of a survey conducted in the Netherlands.[11] Furthermore, higher education is an enabler for the generation and acquisition of green economy knowledge and skills for the future we want.[12] Yet, initiatives in green economy education and training are far from being effective and more needs to be done. As a developing country, there is a growing emphasis in South Africa on balancing developmental and environmental goals. Economic growth and human well- being, albeit essential for South Africa, must not be pursued at all costs, ignoring ecological risks. For this reason, South Africa understands the green economy as a "system of economic activities related to the production, distribution and consumption of goods and services that result in improved human well-being over the long term, while not exposing future generations to significant environmental

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9 Brundtland Commission (World Commission Environment Development), 1987. *Our Common Future*. (Oxford University Press, Oxford).

10 Pearce, D.W., Markandya, A. & Barbier, E.B. (1989). *Blueprint for a green economy*. Earthscan, London.

11 Dakshina G. De Silva & Rachel A. J. Pownall (2014). Going green: does it depend on education, gender or income?, *Applied Economics*, 46:5, 573-586, DOI: 10.1080/00036846.2013.857003

12 Nhamo, G. (2014). Reviewing Some Implications of the Green Economy for Higher and Further Education Institutions. *Southern African Journal of Environmental Education,* Vol. 30, 2014. pp 1-17.

risks or ecological scarcities."[13] An analysis of the relations between environmental regulation and policy making and the demand for skills is central to conceptualising the green economy, green jobs, and green skills. The growth in skills demand is connected to an increase in the demand for those skills training. Thus, where a high demand growth for a skill exists, a shortage of skills training ensues.

As more companies adopt sustainability and environmentally friendly practices, existing jobs will require reskilling. Similarly, the greening of buildings and transport will create demand growth for green facilities management. Notwithstanding South Africa's best efforts in the transition to a green economy, there are several barriers that inhibit this and five themes have been elaborated:

1. Economic: responsible investment, production, and consumption decisions,
2. Institutions: institutional coordination,
3. Technology: support incubating innovations,
4. Financing: lending policies,
5. Skills: train people to create the scarce skills needed in the green economy. [14]

To boost green economy programmes, the Department of Forestry, Fisheries and the Environment (DFFE) identified nine key areas as depicted in Figure 1 below.

Amongst others, the availability of skills, capability and capacity are crucial enablers of such programmes.

[13] Retrieved from https://www.dffe.gov.za/projectsprogrammes/greeneconomy/introduction

[14] *Barriers to greening the South African Economy-WWF- SA*, 2018.

Figure 1 Nine Key Areas in Green Economy Programmes
Source: Department of Forestry, Fisheries, and the Environment (DFFE)

2.2 Education

The 21st century is widely known as the digital era where technology plays a major role. The digital skills revolution is closely related to the proliferation of technology. Digital skills are crucial for any student in Higher Education, as well as for SMEs who seek to start a business. The development of in-demand employability and entrepreneurial skills and competencies is essential in a globally competitive world. Similarly, the combination of soft skills and hard skills are necessary to survive in this competitive world. Hard skills refer to specific and technical knowledge and expertise, whilst soft skills are interpersonal and non-technical skills such as teamwork, problem-solving, critical thinking, and leadership. The changing nature of work and the digital revolution plays an important role in workplace-readiness. To prepare people for the future, education systems need to transform for a shared understanding of the skills needed for the 21st century.

The World Economic Forum (WEF) Education 4.0 Taxonomy (2023)[15] for the future of learning identifies three aptitudes, namely, abilities and skills, attitudes and values, and knowledge and information. Van Laar et al identified 21st-century skills that are not underpinned by Information and Communications Technology (ICT) and make a distinction between seven core skills (technical, information management, communication, collaboration, creativity, critical thinking, and problem solving), and five contextual skills (ethical awareness, cultural awareness, flexibility, self- direction,

[15] Retrieved from https://www.weforum.org/whitepapers/defining-education-4-0-a-taxonomy-for-the-future-of-learning

and lifelong learning.[16] These skills are more relevant to the current economic, social, and ecological developments than to an industrial production complex. Human resource development aims to improve the overall skills of people to make them productive in the economy. The South Africa Human Resources Development Strategy (HRDS) states: "… HRD refers to formal and explicit activities that will enhance the ability of all individuals to reach their full potential."

By enhancing the skills, knowledge, and abilities of individuals, HRD serves to improve the productivity of people in their areas of work – whether these are in formal or informal settings. Increased productivity and improvements to the skills base in a country supports economic development, as well as social development".[17] Human resources and capacity development in Africa is critically important for Africa's development. However, given the largely extractive nature of Africa's economies, skills development is lagging. There is a dearth of skills development and human capital on a resource–rich continent like Africa. Products are developed in other countries, thus stagnating skills development in an extractive economy. The Centre for Africa-Europe relations (ECDPM) is an independent 'think and do tank' that works for policies in Europe and Africa for inclusive and sustainable development. With the focus on climate, energy and food, economy and trade and geopolitics, the Centre provides advice and training through its analysis and research work and asserts that the poor level of skills and development in natural resource management in Africa "… comes not only from lack of incentives to invest in human capital but also from the perverse effects of international division of labour."[18] The overarching goal of formal education is to prepare students for the workplace and the relevance of the curriculum depends largely on the inherent employability skills. Collaboration between employers and educational institutions is thus vital for aligning the skills set of graduates with the workplace requirements and needs. A study to identify which employability skills are lacking in the Science, Technology, Engineering and Mathematics (STEM) industry, showed that of the 16 employability skills, five were the highest ranked, namely, team player, self-motivation, verbal communication, problem-solving and being proactive.[19]

In South Africa an assortment of legislation and policies exist to give effect to the delivery of education and training at different levels and to different sectors. The Further Education and Training Colleges Amendment Bill (2012) gave effect to the

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[16] van Laar, E., Deursen, A.J.M., & van Dijk, J.A.G.M. 2017. The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in Human Behavior*. Vol. 72, (July 2017), pp. 577-588.

[17] HRD-SA. 2009. Human Resources Development Strategy for South Africa, 2010- 2030

[18] Retrieved from https://ecdpm.org/work/miming-for-development-volume-6-issue-3-juky-august-2017/

[19] McGunagle, D., & Zizka, L. (2020). *Employability Skills for 21st Century STEM Students: The Employers' Perspective*. Higher Education, Skills, and Work-Based Learning.

establishment of TVET colleges (Government Gazette, 2020) and the White Paper on Post School Education and Training in SA (2013) sets a clear mandate for TVET Colleges as the primary institutions for delivery of mid-level skills. In terms of this mandate, TVET colleges must produce graduates who will enter employment, be self-employed or pursue further studies. Similarly, the Skills Development Act (1998) aims to provide an institutional framework to devise and implement national, sector and workplace strategies to develop and improve the skills of the South African work force; to integrate those strategies within the National Qualifications Framework contemplated in the South African Qualifications Authority Act, 1995; to provide for Learnerships that lead to recognised occupational qualifications; to provide "for the financing of skills development by means of a levy-grant scheme" and "a National Skills Fund; to provide for and regulate employment services; and to provide for matters connected therewith.[20] Both institutions play a crucial role in environmental education and green skills development.

TVETS plays a crucial role in entrepreneurship education. The Department of Higher Education and Training administers the TVET programme, which falls under Post-School Education and Training (DHET). They accomplish this collaboration with several other educational institutions and regulatory authorities, including the South African Qualification Authority (SAQA) and the Quality Council of South Africa (QCSA). The term TVET has its origins in the 1999 UNESCO Congress and is an international educational initiative to improve vocational training globally. South Africa adopted the term TVET in 2012 and there are currently 52 public TVET colleges with more than 700,000 students. TVETS continues to expand in popularity and student numbers and aims to align international trends and standards. The Department of Higher Education and Training has authorised and supervises TVET colleges. The Department concentrates on vocational and occupational education and training with the goal of preparing students to work in a skilled trade as functioning workers. Unlike universities, which require a bachelor's degree, TVET colleges allow students who have completed Grades 9, 10, 11, or 12. Some colleges offer a choice of up to 300 distinct courses.

The role of Sector Education and Training Authority (SETA) green skills training is significant. A SETA study on skills for conservation at World Wildlife Fund (WWF) South Africa, showed that green skills studies need to be more than just theoretical research but also need to engage employers and skills planners in a reflexive process to re-think 'business as usual'. There is a collaboration between employers, SETAs, DHET and other parties to better determine green skills needs at a firm and sector

[20] Government Gazette, Vol. 401, No 19420.

level, in several priority segments of the green economy. Identifying green skills needed in selected value chains will differentiate green occupations and occupational pathways. Key outputs include a practical toolkit and a submission on the refinement of the occupations on the Organizing Framework for Occupations (OFO), to better reflect green occupations in South Africa.[21]

Changing technology impacts industries, especially the nature of work. The most dramatic effect of technology on employment is that more goods and services are produced with less labour. Changing technologies also affects organisational structure and the types of skills needed by workers. Skills are complex and may involve both formal education and training as well as on-the-job experience. Tacit skills are defined as "… those bits of information and knowledge that are not easily expressed as formal knowledge but are nevertheless essential for doing work correctly and efficiently."[22] Furthermore, experiential learning is paramount to developing employability and entrepreneurial skills. Assessing student's entrepreneurial skills development in live projects over time, Lichtenstein et al found that students' perceptions of their skills changed over time.[23] The students' abilities were tested across the 17 categories of entrepreneurial skills and, importantly, the study found that entrepreneurship education programmes can benefit from structured skills training.

2.3 Entrepreneurship

The Entrepreneurship Competence Framework, also known as EntreComp, offers a tool to improve the entrepreneurial capacity of European citizens and organisations and defines entrepreneurship as a transversal competence, which applies to all spheres of life: from nurturing personal development, to actively participating in society, to (re)entering the job market as an employee or as a self-employed person, and to starting up ventures. It builds upon a broad definition of entrepreneurship that hinges on the creation of cultural, social, or economic value.[24] This definition thus embraces different types of entrepreneurships, including intrapreneurship, social entrepreneurship, green entrepreneurship, and digital entrepreneurship and applies to individuals and groups (teams or organisations), and refers to value creation in the

[21] Retrieved from: https://www.greenskills.co.za/greenskills-live-projects/mapping-green-occupations-and-the-ofo/

[22] Hodson, R., and Sullivan, T.A. (2012). *The Social Organization of Work*. Wadsworth, Cengage Learning.

[23] Chang, J. & Rieple, A. (2013). Assessing students' entrepreneurial skills development in live projects. *Journal of Small Business and Enterprise Development*. Vol. 20 (1), pp. 225-241.

[24] Bacigalupo, M., Kampylis, P., Punie, Y. & Van den Brande, G. (2016). *EntreComp: The Entrepreneurship Competence Framework*. Luxembourg: Publication Office of the European Union; EUR 27939.

private, public and third sectors and in any hybrid combination of the three. The definition implies that one can act upon ideas and opportunities to generate value for others in any domain and possible value chain. Innovation and entrepreneurship development are interconnected and the ability to invent and innovate is an ability that can be developed and is not an innate attribute. By creating a life-changing experience for a customer through innovation, the entrepreneur creates different economic offerings like commodities, services, goods, experiences, and transformations. The EntreComp framework is a reference for any initiative aiming to foster entrepreneurial capacity of European citizens and consist of three interrelated competence areas namely '*ideas* and *opportunities*', '*resources*' and '*into action*'. It is composed of five competences, which, combined, constitute the building blocks of entrepreneurship as a competence.

The 15 competences are thus developed along an eight-level progression model and proposes a comprehensive list of 442 learning outcomes. The framework can be used as a basis for the development of curricula and learning activities fostering entrepreneurship as a competence.

Climate change and environmental regulation are key determinants of new skills for sustainable development, a key policy issue for countries at all levels of development. To achieve the desired outcomes of sustainable development, the right skills must be cultivated and be available. The International Labour Organisation (ILO) published a practical guide to the skills needed for green jobs in 2015 asserting that in moving towards a greener economy, opportunities for the introduction of new clean technologies, green investments and jobs are created. However, climate change and environmental degradation are constrained by the shortage of human capital to deploy the technical solutions that are required.[25] The guide focuses on understanding and measuring the skills implications and provides guidance on how to embark on the identification of current and in anticipation of future skill needs for the green economy and green jobs. Reskilling and upskilling in both technical and core skills, are thus indispensable for a green transition, especially given the skills gaps and shortages. The ILO furthermore criticises the lack of comprehensive information on demand and supply related to skills for green jobs. This lack is due to the shortage of professionals and a paucity of university graduates, especially those trained in STEM skills. A lack of both technical and transferable core skills persists with negative implications for a country's ability to identify skills gaps and analyse future training needs and shortages. The green transition and the innate skills demand, thus have significant implications for the development of human capital,

[25] Gregg, C., Strietska-Ilina, O. & Büdke, C. (2015). *Anticipating skill needs for green jobs A practical guide.* © International Labour Organization

employability, and competitiveness. Any meaningful participation in the greener society implies that all citizens must be imbued with competences for personal development, social inclusion, active citizenship, and employment. According to the Entrecomp framework, these competences include literacy, numeracy, science, and foreign languages, as well as more transversal skills such as digital competence, entrepreneurship competence, critical thinking, problem solving or learning to learn.

A green economy assumes an economic system wherein economic growth converges with environmental limitations and responsibilities. Whilst conventional entrepreneurship is primarily focused on value creation through economic growth and development, green entrepreneurship considers the impact of business activities on the environment. Green entrepreneurs play a pivotal role in the green economy, and they seek business opportunities in the green market. Moreover, green entrepreneurship contemplates economic processes to create value also at a social and environmental level. Green entrepreneurship refers to a special subset of entrepreneurship that aims to create and implement solutions to environmental problems and to promote social change so that the environment is not harmed.[26]

Green entrepreneurs run their businesses involving risk and seeking opportunities for the viability of their businesses. Mindfulness and sound principles ensure that they run their businesses with a positive impact on the environment. Such entrepreneurs are environmentally conscious and operate in an eco- friendly way. Motivation plays a major role in the sustainability of their businesses and business activity. According to Parrish (2010), “The motivation of green entrepreneurs to pursue sustainable ventures can thus be either opportunity-driven or sustainability-driven: opportunity-driven entrepreneurs aim at building a profitable business venture and use sustainability as a business opportunity for gaining profit; sustainability-driven entrepreneurs aim to contribute to sustainability and thus a profitable business is a means for achieving this.”[27]

An effective entrepreneurship ecosystem therefore is a pre-requisite for sustainable economic and social development with key role-players like government, small business, TVETS, financial institutions and incubators. Entrepreneurship education is also imperative for developing an entrepreneurial culture. Education about and education for entrepreneurship are both essential building blocks for a spirit of green entrepreneurialism.

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[26] Saari U.A. & Joensuu-Salo, S. (2019). *Green Entrepreneurship*. In: Leal Filho W., Azul A., Brandli L., Özuyar P. & Wall T. (eds) Responsible Consumption and Production. Encyclopedia of the UN Sustainable Development Goals. Springer, Cham., p.3.

[27] Ibid.

Chapter 3 Analysis of existing entrepreneurial green skills in Sub-Saharan countries

This chapter focuses on the skills demand in SSA countries with reference to the socio- economic factors, the policy and regulatory environment, the SME sector, the role of TVETs in entrepreneurship education and development, the green economy and the development of green skills interspersed with an interrogation on diversity, equality, and inclusivity (DEI). The chapter offers a secondary analysis of existing entrepreneurial green skills in South Africa, Kenya, and Nigeria. Geographically Sub-Saharan Africa (SSA) includes all regions in Africa that lie south of the Sahara Desert. With an estimated population of 1.1 billion (2019), the region constitutes a large part of the continent and boasts diverse climate zones and ecoregions.[28] With a population growth rate of 2.3%, the United Nations (UN) predicts that the population will grow between 2-2.5 billion by 2050. In 2022, 460 million people were anticipated to be living in extreme poverty because of the Covid-19 pandemic. Government debt rose from 28% of gross domestic product in 2012 to 50% of gross domestic product in 2019. COVID-19 worsened matters and government debt rose to 57% of gross domestic product in 2021. With populations of 59 million, 174 million and 39 million respectively, South Africa, Kenya, and Nigeria account for more than a fifth of SSA population.

Africa is the world's second largest and second-most populous continent and the deficits in African economies are historical. Yet, Africa remains the world's poorest and least developed continent: colonisation has systematically deprived Africa of self-reliance and development. The former Organisation for African Unity (OAU) established a turnaround plan to drive Africa's development and industrialization. According to the Africa Capacity Indicators 2013, a report produced by the African Capacity Building Foundation (ACBF), steady progress has led to the continent posting some of the world's fastest economic growth rates and demonstrating prowess in other sectors. "There are endless opportunities for Africa to translate its abundant natural resources endowment into broad economic development. Africa currently produces 48% of the world's platinum, 48% of its diamonds, 46% of its chromium, 28% of its gold and approximately 10% of global oil reserves."[29]

Mining, tourism, and agriculture generate about 80% of foreign exchange earnings whilst the continent's green and maritime economic sectors remain untapped.

[28] Retrieved from https://en.wikipedia.org/wiki/Sub-Saharan_Africa

[29] African Capacity Building Foundation (ACBF). (2013). *Africa Capacity Indicators 2013: Capacity Development for natural Resource Management*. Knowledge and learning Department ACBF, Harare.

Africa's boisterous economic growth offers much hope to the youth. Its economic growth is projected at 4.6% and the burgeoning SME sector is a significant catalyst for this. In Sub-Saharan Africa there are approximately 44 million micro, small, and medium enterprises. The sector creates an estimated 80% of employment with implications for the formation of a middle class and demand for services.

The International Monetary Fund (IMF) estimates that by 2035 the number of Africans joining the working age population will exceed that of the rest of the world combined. The World Economic Forum (2015) contends that SMEs and the youth are at the centre of Africa's emergence as a global force: "Still, the foundation of any long-lasting venture in Africa depends on the continuous empowerment of regional SMEs and young entrepreneurs. Governments, the private sector, and international investors must consider Africa's young people and SMEs central to the stability of the world's economy. These millions of future entrepreneurs need to be nurtured so that the world at large can benefit."[30] Yet even though they are labelled the backbone of the world economy, Africa's youth are still lacking in essential areas and access to finance and to markets are significant challenges for SMEs. The Centre for Strategic and International Studies (CSIS) alludes to access to finance and elaborates this with reference to accessibility and affordability. Accessing capital remains the biggest barrier for African entrepreneurs, partly due to the informal nature of many SMEs and to their lack of creditworthiness. High interest rates also deter SMEs from accessing capital and thus makes raising capital unaffordable.[31]

To improve SMEs ability to access finance, a blended finance ecosystem is proposed: "The end goal of blended finance is to increase SMEs' ability to access private capital independently, without having to rely on grants or concessional terms."[32] Given these barriers and other challenges, it is apparent that African SMEs cannot easily sustain their businesses: "It is harder for SMEs focused on sustainability and green business to gain financial support because there are typically higher up-front costs, and the markets are underdeveloped. Green technology is expensive because it is newer and comes with many up-front costs associated with instalment. Green SMEs may also suffer from high interest rates as they begin to use and implement new technologies since they lack collateral and have a perceived higher risk as a business."[33] However, climate change presents an opportunity for $3 trillion investment in Africa and incentivisation is paramount to attain sustainability

[30] Retrieved from https://www.weforum.org/agenda/2015/08/why-smes-are-key-to-growth-in-africa/

[31] Runde, D.F., Savoy, C.M. & Staguhn, J. (2021). *Supporting Small and Medium Enterprises in Sub- Saharan Africa though Blended Finance*. Washington, Centre for Strategic and International Studies (CSIS).

[32] Ibid.

[33] Ibid.

and green growth among SMEs. Blended finance is one crucial way whereby SMEs can access debt markets and thus adapt their practices to meet climate risks. If SMEs are to play a role in the green economy, financial barriers must be addressed. Importantly, this role must coincide with a robust education and training for green entrepreneurship. An overview of existing entrepreneurial green skills in South Africa, Kenya and Nigeria will provide a picture of the state of green entrepreneurship in Africa, albeit not entirely representative. The economies of these three countries are quite substantial, and this analysis may offer valuable insights as well as identify gaps and shortages.

3.1 South Africa

South Africa is widely considered the most industrialised economy in Africa. However, South Africa is one of Africa's leading emitters of carbon emissions due to its heavy reliance on coal-fired energy generation. Due to its apartheid legacy, South Africa also suffers huge deficits in reducing unemployment, poverty, and inequality. These challenges, coupled with an established extractive and manufacturing economy dependent on a minerals-industrial complex, makes South Africa's transition to a net zero economy difficult. Given its flexibility and adaptability, small business is deemed more amenable to transitioning to a green economy.

The Green Economy Inventory of South Africa (GEISA) documents the initiatives for the country's transition to a resource-efficient and low–carbon economy. Although not a comprehensive report of green activities, the GEISA shows widespread and increasing activity in the green economy.[34] As a diverse country with nine provinces and a rural-urban dichotomy, green initiatives are distributed unevenly. There is some measure of geographical disparity among provinces, but there is increased implementation of green strategies in all the provinces. Given its historical backlogs and, as an emerging economy, South Africa's green initiatives are evolving a higher intensity of activities in the urbanised provinces. Despite these notable advances, there are caveats. The need for overall total commitment, continuous and inclusive social dialogue, clarity about the conceptual framework for a green economy and, importantly, a paradigm shift from business-as-usual to innovation, is indispensable for the greening of South African society. The GEISA provides useful insights on the different sectors of the green economy with significant implications for green jobs and the concomitant skills development strategy. One of the GEISA recommendations pinpoints agriculture, food production, fisheries, and forestry as the sector with the

[34] PAGE (2017), *Green Economy Inventory for South Africa: An Overview*. Pretoria. South Africa. pp.1-78

highest potential to create direct jobs.[35] As such, developing skills and building capacities are identified as key strategic interventions. Relevant skills development, inclusive of business management and technical skills, is also crucial to harnessing the employment creation benefits of the green transformation. The GEISA also lists the following cross-cutting themes used to examine and understand some of the overarching impacts of identified initiatives in South Africa's green economy transition: governance and partnerships, trade, finance and investment, research, awareness, training, skills development, and knowledge management. South Africa's Just Energy Transition (JET) Framework targets environmental, social, and economic outcomes and is premised on a robust governance portfolio of implementation.[36]

Changes in the economy can affect the demand for skills in general. Several sources cite a demand for high-level skills in various sectors of the SA labour system. For example, Earle (2007)[37] notes a rising demand for high-level agricultural skills among farmers, farm managers, foremen, also in research and product development, sales and marketing functions of firms supplying primary agriculture, government entities, and public and private sector Research and Development. Kraak (2008)[38] underscores the importance of a multi-faceted skills development strategy operating at three levels: high-skills policies, ongoing need for intermediate skills, and provision of basic, entry-level skills. Green jobs require a diverse set of skills appropriate to the needs of a green economy which may include technical, managerial, and communication skills. Vona (2015)[39] found that green skills need high-level analytical and technical know-how related to the design, production, management, and monitoring of technology, and that environmental regulation triggers technological and organisational changes that increase the demand for hard technical, engineering, and scientific skills.

3.1.1 Socio-economic context

South Africa is a young democratic, multicultural country experiencing several crises. The country's biggest challenge for many years, labelled the 'triple challenge', is unemployment, inequality, and poverty (UIP). The Gini Coefficient in South Africa, a global measure of inequality, is the highest in the world. According to World

35 Ibid.

36 The Presidency South Africa. (2022). *South Africa's Just Energy Transition Investment Plan* (JET IP). Pretoria. www.presidency.gov

37 Earle, N., & Paterson, A. (2007). The shape of demand for high- level agricultural skills in the South African labour market. *Development Southern Africa* Vol 24, (4), pp.575-593.

38 Kraak, A. (2004). Rethinking the high skills thesis in South Africa. *Shifting Understandings of Skills in South Africa.*

39 Vona, F. et al. 2015. *Green Skills*. Working Paper 21116, National Bureau of Economic Research.

Economics, South Africa Gini Coefficient Index is 36.4 as last measured in 2019.[40] UIP has been a primary focus in the post-1994 transformation period and several development and growth strategies have been established, such as the Reconstruction and Development Programme (RDP), Growth, Employment and Redistribution (GEAR), Accelerated and Shared Growth Initiative for SA (ASGISA) and National Development Plan (NDP).

In the Covid-19 period and with post-pandemic challenges such as UIP, eco-growth, instability and the energy crisis, South Africa's grey listing remained constant. South African socio-economic history is inextricably linked to its attempt to transition to net-zero emissions, but various barriers influence these efforts namely, an incipient Education and Training system that is still in its development stage and faced with huge historical backlogs and historical dependence on fossil fuel to power the economy which, as a mineral rich country, is still dominated by mining. South Africa is Africa's most industrialised country and industrial production and manufacturing remain its primary economic activities thus its persistent socio-economic challenges interfere with economic reprioritization and capital investment and government funding is constrained by poor economic performance.

Although South Africa's transition to a green economy is envisioned as an important means to respond to critical development challenges facing the country, the challenges of high levels of unemployment, poverty and inequality are intertwined with energy security and climate change. The 'just' transition refers to a transition to green energy that considers the many disadvantaged South Africans who are still employed in the fossil fuel and related industries and how such a transition would have serious consequences for the majority of poor people.

3.1.2 Policy and regulatory framework

The Department of Forestries, Fisheries and Environment (DFFE) lists the available green economy policies[41] and how South Africa prioritised a green economy and initiated several enabling policies to steer the country towards a green economy. The prioritisation is reflected in several policies supporting the transition to a green economy in South Africa and covering the period from 2008-2030.[42] Examples of the policies include: 2008: *National Strategy for Sustainable Development and Action Plan* which identifies sustainable development as a long-term commitment and gives

[40] Retrieved from https://www.worldeconomics.com/Inequality/Gini-Coefficient/South%20Africa.aspx

[41] Retrieved from https://www.worldeconomics.com/Inequality/Gini-Coefficient/South%20Africa.aspx

[42] Gulati, M., Naude, L., & Upadhyaya, P. (2018). *Barriers to greening the South African Economy*. WWF-SA.

equal importance to environmental protection, social equity, and economic efficiency, combined with the country's visions and values as follows:

2008–18: *Ten-Year Innovation Plan* which recognises that South Africa is well-positioned to lead regarding sea protection, climate change and its impacts in Africa; and to identify mitigation efforts to limit long-term effects as well as to identify economic opportunities to take advantage of the green economy.

2011: *Green Economy Accord* signed by organised labour, business representatives, government departments and wider community which identifies 12 commitments to promote the green economy and commits to mobilising stakeholders to generate five million new jobs by 2020.

2011: *National Climate Change Response White Paper* identifies green economy sectors as the avenue for job creation and promotes the green economy as an effective investment to climate change.

2012: *National Development Plan (NDP) 2030* with outcomes such as ensuring decent employment through inclusive economic growth; reskilling the workforce to support an efficient, competitive, and responsive economy; developing an efficient infrastructure network; developing vibrant, equitable and sustainable rural communities; ensuring food security and valuing, protecting and enhancing environmental assets and natural resources. Although skills development and active labour market policies are vital, NDP and the Economic Reconstruction and Recovery Plan (ERRP) are vague on the topic of green economic transformation. Policy guidance for Just Transition and green economic transformation across the different pillars for economic and social development are absent and the only guiding policy documents for education and TVET are the National Skills Development Plan 2030 (NSDP) and the Skills Strategy under the ERRP.

3.1.3 The SME Sector

Small and Medium Enterprises (SMEs) are independent businesses that maintain revenues, assets, or employees below a certain threshold. The emergence of neo-liberalism and globalisation amplified the role of SMEs in developing countries as agents of economic efficiency, healthy business climate and a force for economic development. SMEs have gained prominence due to their capabilities for quick adaptation, working with less capital and low-cost management as well as cheap production.[43]

[43] Keskin, H., Senturk, C., Sungur, O. & Kiris, H. (2010). *The importance of SMEs in Developing Countries*. 2nd International Symposium on Sustainable Development, Sarajevo. pp.1-10.

The classification of SMEs varies from country to country. However, there are some common criteria used to classify SMEs, such as the number of employees, annual turnover, and assets. In general, SMEs have fewer than 250 employees, less than R15m million in annual turnover, and less than R43 million in assets. SMEs are also characterised by their independent ownership and control. SMEs are essential for economic growth and development and play a crucial role in job creation, innovation, and overall economic growth. SMEs are responsible for creating more than 50% of jobs in many countries and contribute significantly to exports and GDP. A source of innovation and creativity, SMEs are more flexible and adaptable than larger companies.[44] Small business in South Africa, despite its minute size and an unhelpful economic policy landscape, is making a significant impact on the economy. According to the economic research institution, Trade & Industrial Policy Strategies (TIPS), The Small Business Report (2023),[45] formal small businesses comprise 30% of total employment in South Africa and contribute an estimated third of the total value added to the economy. TIPS maintains that there were 710,000 formal small businesses in the country in 2022, up from 680,000 in 2019 before the COVID-19 pandemic and that South Africa has around 1.7 million informal enterprises. Furthermore, the TIPS report found that, generally, small businesses are both more labour-intensive and more profitable than their larger counterparts, for example, in 2020, small businesses reported a 5% return on assets, compared to 2% for large companies while medium-sized enterprises reported the best return on assets at 7%. The TIPS report also highlighted that the adaptation actions made necessary by climate change are insufficient for resilience, with notable gaps in knowledge, finance, technology, and governance and recognised that the just transition process as an opportunity to develop domestic small, green businesses. In addition, the TIPS Report on Small Business Development in the Climate Change Adaptation Space (2019) is part of a broader initiative on small business development in South Africa's climate change strategy. The research comprises a main report, which summarises the research findings on the topic, and five case studies on South African-based entrepreneurs active in the adaptation space: AB Farms, EWEF-SusTech, Loo Afrique, MySmartFarm and Waste Intrique.[46] Mitigating the negative impacts and risks of climate change is proposed through adaptation to impacts and opportunities to improve the resilience of small businesses. Adaptation implies actions and processes in the broader context of sustainable development and exposes gaps in knowledge and skills which can open opportunities for innovations and creativity. The

[44] Savlovschi, L.I. & Robu, N.R. (2011). *The Role of SMEs in Modern Economy. Economia. Seria Management*. Vol 14, (1).

[45] Retrieved from https://www.tips.org.za/

[46] Montmasson-Clair, G. Mudombi, S. & Patel, M. 2019. *Small business development in the climate change adaptation apace in South Africa*. TIPS and Government of Flanders.

behavioural and functional aspects of adaptation that underpin the development of adaptability are skills such as communication, learning, problem-solving, resourcefulness, leadership, organisation, teamwork, and creative and strategic thinking. Small, Medium and Micro-Sized Enterprises (SMMEs) are particularly well-suited to seize such opportunities. Although small business can drive adaptation in a country's economy, the potential for adaptation-driven needs, investments, and mechanisms to generate socio-economic opportunities for small businesses remains largely unexplored and misunderstood.[47] The Green Outcomes Fund (GOF) provides funding to support investment in local SMEs that contribute to the green economy.

3.1.4 Development of entrepreneurial skills

As Lloyd Shefksy claims, "entrepreneurs are made, not born"[48] and the belief that entrepreneurship is an innate individual attribute has long been debunked. Entrepreneurs can be developed through building entrepreneurial skills because, as Lichtenstein and Lyon (2001) explain, "Entrepreneurship involves a set of skills that is the result of cultivation and development rather than innate endowment."[49]

The development of entrepreneurial skills in South Africa has been formalised through curriculum changes in the education sector and private sector initiatives. The embeddedness of such skills depends principally on the introduction of entrepreneurship education in school curricula which has led to a rapid increase in entrepreneurship education. Education and training 'for' and not just 'about' entrepreneurship is a critical outcome of curriculum reform, and, for example, business schools have introduced innovative ways to introduce entrepreneurship into business education courses. Yet some scepticism about whether entrepreneurship can be taught persists.

Entrepreneurial skills allude to both a life skill and a social and economic value. Accordingly, "the development of entrepreneurial characteristics can have beneficial impacts for the individual, and society, beyond the economic domain."[50] Because entrepreneurs' skills in creating and operating new businesses is critical for the success of a business, "… a green economy greatly emphasises education and training to meet the needs of a greener and more sustainable future, as providing

47 Retrieved from https://www.tips.org.za/

48 Shefsky, L. (1994). *Entrepreneurs are made not born: Secrets from 200 entrepreneurs*. McGraw- Hill.

49 Lichtenstein, G.A. & Lyons, T.S. (2001). *The Entrepreneurial Development System: Transforming Business Talent and Community Economies*, Vol 15,(1).

50 Walmsley, A. & Wraae, B. (2022). Entrepreneurship Education but not as we know it: Reflections on the relationship between Critical Pedagogy and Entrepreneurship Education. *The International Journal Management Education* 20 (2022), 100726.

relevant education and training opportunities for a new, green workforce will be critical to achieving a successful transition (UNEP, 2013).[51]

A South African study of Entrepreneurship Education in a tertiary context recommended that, in addition to traditional teaching methods, various other approaches can be used to stimulate entrepreneurial education for skills development and that a closer relationship between academia, government, and industry is paramount. Universities must incorporate entrepreneurial education in all their qualifications, expose students to on-the-job training, assist with the incubation of students' business ideas, and provide a platform for cross-pollination of knowledge between industry, academia, and government.[52] The dominant approach to developing entrepreneurship is a focus on skills and is largely influenced by the high levels of youth unemployment, and biassed by a dominant human capital, productivist approach.[53] The authors of the study propose a critical entrepreneurship education approach at TVET level which contributes to capabilities for learning, social justice, and democratic citizenship as there is a longstanding belief that entrepreneurialism is the key to economic growth. In South Africa there are several initiatives, both private and public, aimed at boosting entrepreneurship education as it is widely accepted that entrepreneurship education is important in cultivating skills for the future. In addition, there is a common belief among experts that the small business sector (SMEs) can make a significant contribution to economic growth in SA.

A South African study of entrepreneurship education at TVET institutions found that poorly trained educators and a lack of adequate resources are common barriers to the successful implementation of entrepreneurship education.[54] The National Department of Higher Education and Training (DHET) recognises the importance of entrepreneurship education and established Entrepreneurship Development in Higher Education (EDHE) to embed entrepreneurship among students, academics, and universities.

The aim of entrepreneurship education is to enable students to become more economically active and entrepreneurial and thereby either choosing a business

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51 UNEP Report. Retrieved from: https://www.unep.org/about-un-environment/policies-and-strategies/un-environment-strategy-environmental-education-and

52 Amadi-Echendu, A.P., Phillips, M., Chodokufa, K. & Visser, T. (2016). Entrepreneurial Education in a Tertiary Context: A Perspective of the University of South Africa. *International Review of Research in Open and Distributed Learning,* Vol.17, (4).

53 Forcher-Mayr,M. & Mahlknecht,S. (2020). Critical Entrepreneurship Education in General Education and TVET: Concepts of Practice in a South African Township. *Sociology Discourse and Communication for Sustainable Education*, pp. 65-84.

54 Isaacs, E., Visser, K., Friedrich, C. & Briljal, P. 2007. Entrepreneurship education and training at the Further Education and Training level (FET) in South Africa. *South African Journal of Education.* Vol. 27, No. 4.

venture as a first choice or as an alternative if they have difficulty finding employment.[55]

A special greening initiative for seven TVETs in South Africa to foster skills for green jobs was initiated in 2013, partly due to the importance of TVETs in integrating green issues in training, policies, and plans. The overarching aim was to encourage a transition from individual competence development to institutional change (Skills for Green Jobs, 2014).

The Goldfields TVET College Centre for Entrepreneurship (CFE) is a partnership between the Department of Small Business Development and the Department of Higher Education and Training and was officially launched in 2017. The core business of the centre is to transform youth from job seekers into job creators. The area of specialisation is Renewable Energy (focus) and Generic (sub-focus). CFE is administered by SEDA and Goldfields TVET College. CFE supports its incubatees with equipped working space, coaching, mentoring, access to internet, financial and education, depending on the specific program.

Another initiative by Goldfields TVET College CFE is the certified and licensed GROWTHWHEEL. The mission of this incubator is to stimulate the establishment and growth of technology-based, start-up companies and other compatible businesses. By fulfilling this mission, the incubator aims to contribute to job creation, and provide for enhanced economic health.[56]

As mentioned, entrepreneurship education, although a developing field, is important for South Africa's development objectives and higher education institutions are key role players in developing entrepreneurship education. However, business education curricula do not always include sustainability and pro-environmental topics in entrepreneurship programmes[57], although adapting to circularity and sustainability is paramount for entrepreneurship education to promote a green entrepreneurial mindset. An email survey to determine the importance of entrepreneurship in South African higher education institutions, found that entrepreneurship education in South Africa is in its developmental stage, with evidence of an increasing commitment from the institutions in academic, research and outreach.[58] Teaching and assessment still follow the traditional classroom delivery models and entrepreneurship research is not as rigorous as in other management disciplines. The study made recommendations

[55] Retrieved from https://edhe.co.za/

[56] Retrieved from https://goldfieldstvet.edu.za/centre-for-entrepreneurship/

[57] Uvarova, I, Mavlutova, I. & Atstaja, D. (2021). *Development of the green entrepreneurial mindset through modern entrepreneurship education.* BA School of Business and Finance, Latvia. IOP Conference Series Earth and Environmental Science.

[58] Co, J. & Mitchell, B. (2006). Entrepreneurship Education in South Africa: A nationwide survey. June 2006 *Education and Training* 48(5), pp.348-359.

for curriculum development, evaluation of teaching and assessment methodologies and forming partnerships with local communities for opportunities in internships and worksite visits.

South Africa's National Development Plan (NDP, 2011) envisions the TVET sector as a key factor in its strategy to expand the country's skills base over the long term. TVET institutions are thus critical players in the development of skills to reduce skills shortages and youth unemployment.[59] However, a five-year Research Programme on TVETs, commissioned by the Department of Higher Education and Training (DHET) and funded by the National Skills Fund (NSF), found the sectors' programme qualifications are not responsive to the world of work with a mismatch between supply and demand. The authors of the TVET Research Programme, noting an oversupply and undersupply in some sectors, recommend a locally-driven approach to skills planning as well as integrated and centralised data about the sector throughputs to augment understanding of the role and effectiveness of the TVET sector and to gain an accurate picture of the skills-demand gap.[60] South Africa's just transition to a green society needs fit-for-purpose education and training as transformation can be driven effectively through education to produce the skilled labour for a green society. However, not all sectors are effective. A study on the implementation of green skills in secondary schools in Australia found that schools have a limited role in sharing information about green skills and infusing green skills into various subjects and that while recycling and material management can be done in schools, the application of green skills in real life requires experienced educators.[61]

The linkage between education and sustainability is profound. Education requires alignment with planetary challenges to catalyse its agency in the progressive transformation that is needed.[62] TVETs need to play a significant role in the green economy because the development of green skills is indispensable to ensure sustainable workplace behaviour.

Ultimately, education for sustainability should not only embed embracing and achieving the Sustainable Development Goals (SDGs), but also create consciousness and reconcile people and the planet.[63] Green skills development

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59 Department for Higher Education and Training, 2019.

60 Rogan, M. & Isdale, K. n.d. *Analysis of the responsiveness of TVET College Programme Qualifications (PQMs) to the world of work:* TVET Research Programme. Department of Higher Education and Training.

61 Kamis. A., Rus, R.C., Rahim, M.B., Yunus, F.A.N. & Zakaria, N. 2017. Exploring green skills: A study on the implementation of green skills among secondary school students. *International Journal of Academic Research in Business and Social Sciences,* Vol. 7 (12), 2017.

62 Sterling, S. (2016). A Commentary on Education and Sustainable Development Goals *Journal of Education for Sustainable Development*. Vol. 10, (2). 2011.

63 Ibid.

requires a specific pedagogy that encompasses a relevant and responsive learning and teaching framework. Pavlova (2019) conceptualised an Education for Sustainable Development (ESD) pedagogy relevant to TVETs. Based on a pilot study and literature review, the ESD pedagogy is a Problem-Oriented and Project-Based Learning Plus Model (POPBL) aimed at effective delivery of the green generic module to enhance generic green skills among TVET students: "Thus the model … has the potential to contribute to both the theoretical and practical developments related to the use of ESD pedagogy for developing generic green skills in TVET."[64] However, sustainable development is not always so straightforward. Whilst educational institutions embraced the SDGs, Education for the SDGs (ESDGs) must be critically appraised as "education for the future". Kopnina (2020) argues that economic growth and resource consumption cannot be decoupled due to the hegemony of the sustainability through growth paradigm which has increased pressure on natural resources, increased inequalities and biodiversity loss, climate change and social tensions and proposes an alternative education for sustainability that emphasises a planetary ethic and degrowth through indigenous learning, eco-pedagogy, eco-centric education, education for steady-state and circular economy, empowerment, and liberation.[65]

Reconciling education and training systems with the emerging world of work in the 21st century is both imperative and superlative. Such convergence will make socio-economic and ecological development more meaningful. Bearing in mind that the changing nature of work is intimately linked to changes in the economy, education and training must offer relevant and responsive qualifications suitable for the evolving new suite of occupations in the context of the Fourth Industrial Revolution and the Green Society.

3.1.5 Greening of the South African economy

The central role of TVETs in greening the South African economy has already been discussed. Certain adjustments are necessary to ensure that jobseekers and workers are equipped with competitive and adaptive skills to contribute to the just transition.[66] The greening of South Africa's economy is multifaceted, diverse, and widespread. Ever since the country's 1994 transformation pathway, the redress of socio-economic inequalities, economic growth challenges, impact of the Covid-19 pandemic and the post-pandemic reconstruction have all coalesced to represent South Africa's unique

64 Pavlova, M. & Chen, C.S. (2019). *Facilitating the development of students' generic green skills in TVET: an ESD pedagogical model* In: TVET@Asia, (12), pp.1-23.

65 Kopnina, H. (2020). Education for the future? Critical evaluation of education for sustainable development goals Pages 280-291 | *The Journal of Environmental Education,* Vol. 51,(4), 2020.

66 Freimann, K. & Magnus, G. (2023). *Skills for a Just Transition to a Green Future: Measuring the South African TVET System and providing input to support its development.* GIZ- Career Path Development for Employment project, Johannesburg.

development challenge, namely, to reconcile socio-economic prosperity and well-being with climate action. The South African formal definition of the green economy can be regarded as a "system of economic activities related to the production, distribution and consumption of goods and services that result in improved human well-being over the long term, while not exposing future generations to significant environmental risks or ecological scarcities."

This definition implies the decoupling of resource use and environmental impacts from economic growth and is characterised by substantially increased investment in green sectors, supported by enabling policy reforms. Applying an ecosystem approach to the greening of the economy requires a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way with consideration of the role and diversity of humans as part of many ecosystems.[67] The South African government has firmly committed to the Just Transition to a low carbon, resource- efficient and pro-employment development path. Established in 2011, the Green Economy Accord encapsulates the country's forward thrust in developing green economy strategies. In addition to the government, both private sector enterprises and non-governmental organisations are contributing to the greening of the economy. The Green Economy Inventory for South Africa (GEISA) is an initiative by Partnership for Action on Green Economy (PAGE) and for the South African government to record all green initiatives and establish a knowledge base for improved collaboration, coordination and policy development and implementation.

The GEISA (2016) presents a high-level inventory of green economy initiatives across sectors, spheres of government and service categories. Crucially, the GEISA includes a framework (based on the National Strategy for Sustainable Development, 2011) to assess the green economy initiatives and their contribution to job creation, skills development, and finance.[68]

The policy and regulatory framework, as well as the Green Economy Accord, the National Strategy for Sustainable Development and Action Plan (2011-2014), the New Growth path (2020) and National Development Plan (2030), have laid the foundation for South Africa's green transition. The greening of the economy has found expression in policies in waste management, water, energy, manufacturing, and transport across the country. Green economy strategies have been adopted at provincial level and coupled with investment in skills and technology, are considered vital to the green economic transformation. The organisation, Trade & Industrial Policy Strategies (TIPS), is an independent, non-profit, economic research institution

67 Epstein, C. *Ecosystemic Approach. Saving Earth*: Encyclopaedia Britannica.

68 PAGE (2017), *Green Economy Inventory for South Africa: An Overview*. Pretoria. South Africa.

established in 1996 to support economic policy development. TIPS undertakes quantitative and qualitative research, project management, dialogue facilitation, capacity building and knowledge sharing. Its areas of focus are industrial policy, trade and regional integration, sustainable growth, and a just transition to a sustainable inclusive economy. Some of its key outputs include a green economy knowledge portal namely, the Just Transition Portal, which tracks research on the move to a green economy. TIPS has taken the Just Transition agenda to its centre stage with the aim of lowering the risks faced by the most affected and vulnerable stakeholders, such as working people, small businesses, and low-income communities, while providing an opportunity to maximise the development of new opportunities and redress historical injustices.[69]

The green economy refers to two inter-linked developmental outcomes for the South African economy,[70] namely, growing economic activity (which leads to investment, jobs and competitiveness) in the green industry sector and a shift in the economy towards cleaner industries and sectors. Green finance is primarily aimed at climate action for better environmental outcomes. Green initiatives are thus catalytic projects that mitigate the impact on the environment and funding to supplement public investment comes from international financial aid and private investment, amongst other sources.

In South Africa a combination of investment sources, that is, private funds estimated at R100 billion and public sector investment of close to R36 billion, has led to commitments of several billions of ZAR in initiatives for implementation. In 2009, the country also received a substantial investment of $500 million for its Clean Technology Fund to generate electricity from renewable energy. A multiplicity of stakeholders and role-players are active in South Africa's green economic initiatives. Apart from the government, who is primarily responsible for creating an enabling environment, international agencies, non-governmental organisations, the private sector and educational, research and training institutions fulfil key roles. With reference to the latter, institutes like the Council for Scientific and Industrial Research (CSIR), the Water Research Commission (WRC) and Agricultural Research Council (ARC) play central roles in developing and piloting technological solutions and fostering innovations for a transition to a green economy. In addition, universities also provide academic and research support. Generally, the level of green economic activity in South Africa is burgeoning with a sharp increase in green economy initiatives since 2010.[71]

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69 Retrieved from https://www.tips.org.za/just-transition

70 Retrieved from https://www.dffe.gov.za/projectsprogrammes/greeneconomy/introduction

71 PAGE (2017), Green Economy Inventory for South Africa: An Overview. Pretoria. South Africa.

All key sectors in South Africa's economy and all provinces are active in or associated with the green economy in some way. It has been established that 60% of green economy initiatives are in the Gauteng, Western Cape and KwaZulu Natal (KZN) provinces. Energy, transportation and agriculture are the most active sectors, with initiatives in solar and bio-energy, non-motorised transport and planning, and farming. Western Cape dominates the energy (21) and built environment (14) sectors; Gauteng focuses on the transport sector (18) and KZN focuses on agriculture (21). Agriculture has the largest number of job-creating initiatives; 26 surveyed initiatives report the creation of 50 or more jobs. Agricultural initiatives (primarily farming) are most prevalent in KZN, the Eastern Cape, Limpopo, and Western Cape. Nexus initiatives, where water efficiency is addressed as an input to other sectors such as agriculture, resource conservation and management and energy, are common.

Approximately 53% of the green economy initiatives surveyed are locally funded; 27% are internationally funded and 20% of initiatives did not specify their source of funding. Furthermore, 80% of the surveyed green economy initiatives are funded by domestic public finance; of which 50% are funded by national government departments and 41% of surveyed initiatives are part of multi-stakeholder partnerships that cross an entire value chain from research and development to funding, capacity development, coordinating, implementing, and monitoring. Due to the varied scales and agendas of green economy initiatives, a wide and diverse range of project partners operate horizontally and vertically throughout the country. Despite the burgeoning green economic activities, the South Africa green economy trajectory is still paved with barriers.

3.1.6 Development of green skills

As mentioned, green skills are defined as a set of competences related to the design, production, management, and monitoring of technology. These skills are related to environment, sustainability, green solutions, low-carbon technologies, waste management, renewable resources, energy efficiency and organic farming. Several mega-trends induce major shifts in skills demand and job growth. Technological innovation, greening of the economy, demographic transition and changing consumer needs, all impact skills demand for the future. The development of green skills must be cognizant of a classification of green skills into three categories namely, *generic green skills* (general knowledge, skills, attitudes, and values - SKAV - necessary for sustainable development), *priority green skills* (skills that demonstrates growth and that can be prioritised to gain access to and thrive in the green economy) and *transferable skills* (skills that are pliable in several unique job roles and contribute

to career versatility). A holistic approach to developing green skills is necessary in educational pedagogies for sustainable development. ESD links education to sustainable development and enables holistic, systemic, ecological, and connective ways of thinking and learning.[72]

Climate action and environmental regulation is closely associated with the demand for green skills as both provoke changes in technology and organisation, especially the demand for new skills. Education and training systems need to be reoriented to meet the needs of the green economy. The prior identification of skills complementary to green technology is thus essential to guide training policy. Any analysis of the South African green skills development and training sphere needs to encompass the TVET sector and its impact in creating a workforce for the Green Economy as well as the socio-economic dimensions of the green transformation process.

Recently, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) published a discussion paper comprising seven separate research theses which explore aspects such as the policy dimension, the anticipated changes in labour markets and how TVET systems need to respond.[73]

To enable the implementation of the just transition, the full involvement of the organised labour and businesses in targeted programmes of reskilling and upskilling, and providing employment is needed. Such involvement will ensure that workers are the main beneficiaries of the transition to a greener future and underlines the high relevance of skills development and active labour market policy measures to enable the implementation of a just transition policy. The central document for the implementation of the national agenda 2030 is the National Development Plan (NDP) that aims to create employment through an inclusive job-growth that improves the employment perspectives especially of young people (SDG 8, Decent Employment). The Economic Reconstruction and Recovery Plan (ERRP) emphasises the reduction of poverty, inequality, and unemployment. However, both guiding policy documents remain vague on the topic of green economic transformation and there is still no policy document that provides guidance for Just Transition and green economic transformation across the different pillars for economic and social development. The guiding policy documents for education and TVET are the National Skills Development Plan 2030 (NSDP) and the Skills Strategy under the ERRP. These strategies aim at improving the labour market relevance of TVET, expanding work-

[72] Pavlova, M. & Chen, C.S. (2019). *Facilitating the development of students' generic green skills in TVET: an ESD pedagogical model*. In: TVET@Asia, (12), pp.1-23.

[73] Freimann, K. & Magnus, G. (2023). *Skills for a Just Transition to a Green Future: Measuring the South African TVET System and providing input to support its development.* GIZ- Career Path Development for Employment project, Johannesburg.

based learning, and placing greater emphasis on upskilling and reskilling of the labour force.

These policy documents do not provide direct references on the greening of skills (apart from the inclusion of a few qualifications) or on education for sustainable development. Developing green skills and green entrepreneurship are interlinked and a growing movement in South Africa, especially among young and emerging entrepreneurs. Hence, a green economy presents advanced sustainable development and economic growth with implications for investments, employment, skills development and producing positive social and economic outcomes. The role of SMEs in creating green jobs as opposed to big companies cannot be undervalued. In 2012, 1 in 8 employees of small and medium-sized firms had a green job or almost 13% of all SME jobs, whereas large firms counted only 1 in 33 equivalents to 3% of all large company jobs.[74]

South Africa views a green economy as a sustainable development path based on addressing the interdependence between economic growth, social protection, and a natural ecosystem. This approach would ensure that green economy programmes are supported by practical and implementable action plans which build on existing best processes, programmes, initiatives, and indigenous knowledge in key sectors. The vision "Towards a resource efficient, low carbon and pro-employment growth path" is the collective responsibility of government, the private sector and civil society.

The country's sustainable development vision is enunciated in the National Framework for Sustainable Development (2008): "South Africa aspires to be a sustainable, economically prosperous and self-reliant nation state that safeguards its democracy by meeting the fundamental human needs of its people, by managing its ecological resources responsibly for current and future generations, and by advancing efficient and effective integrated planning and governance through national, regional and global collaboration."[75] The assessment of green skills demand requires planning and provisioning on a nationally coordinated scale.

The Green Economy Learning Assessment South Africa (GELA), 2016[76] was the product of a study to assess the gaps in skills and the national Environmental Sector Skills Plan (ESSP) study (2010) revealed certain gaps in skills planning and

74 Ogujiuba, K., Rensburg, N., Naseer, M., Ogujiuba, C. & Estelle, (2021). *SMEs and Sustainable Entrepreneurship in South Africa: Impact Analysis of Contextual Factors in the Services Sector.*

75 Department of Environmental Affairs and Tourism. (2008). *People-Planet-Prosperity: A National Framework for Sustainable Development in South Africa.* Retrieved from https://www.gov.za/documents/national-framework-sustainable-development-south-africa

76 PAGE (2016), Green Economy Learning Assessment South Africa: *Critical Competencies for Driving a Green Transition.*

provisioning. In 2011 the Green Economy Accord paved the way for a more systematic approach. Hence, in 2016 the Partnership on Action for a Green Economy (PAGE) initiated a call for a Green Economy Learning Assessment (GELA). This report is part of PAGE which is an initiative of the UNEP, ILO, UNDP and UNIDO and UNITAR in collaboration with the South African Government. The four main outputs of the GELA were:

- A competency framework which allows for a structured analysis of green economy learning needs.
- A database of 170 learning opportunities/courses offered by universities, research institutes, not-for-profit organisations, development partners and others.
- A list of priority actions to advance learning and skills development for greening the South African economy.
- A self-assessment tool for teams designing or implementing green economy policies, to identify potential competency gaps and suitable learning opportunities.[77]

Using a variety of data sources, seven competency clusters and associated learning needs which are regarded as critical for green economy policy were identified. The competency clusters are elaborated in associated technical, relational, and transformational competencies. There is thus a diverse range of competencies which inheres not only in individuals, but also in teams. Technical competencies are specific to an occupational role and context, whilst relational and transformational competencies are more generic. The competencies are the associated skills, knowledge, and values.

Some of the key recommendations to build capacity include a green economy knowledge platform as a database for learning and assessment, expansion of introductory green economy courses, development of courses in integrated energy, waste and water management, courses in reflexive evaluation and adaptive management, training of trainers, and mainstreaming the findings of the GELA in sectoral skills planning nationally. Although skills development and training permeate all sectors of the green economy, there are backlogs. Given its central importance to incrementing green economic activity, mapping the existing skills will focus on skills gaps, skills needs or skills mismatch. More precisely, such mapping will identify skills

[77] Ibid, pp. 6-32.

shortages for SMEs in the green economy for each country. Although the GEISA does not focus on training per se, it records concerns about it being neglected.[78]

Initiatives by NGOs like the Wildlife and Environment Society of South Africa (WESSA's) Groen Sebenza Project,[79] which translates to 'Green Work', is a Jobs Fund initiative that promotes major skills development and job creation in the biodiversity sector for 800 unemployed graduates and matriculates. The intake consists of 500 graduates and 300 matriculates. The Groen Sebenza Project aims to build the capacity required to address the environmental issues and opportunities in South Africa through job creation on a sustainable basis, with a particular focus on professional development, resource management and entrepreneurial skills. The objectives are to create jobs in the environmental sector and to ensure that the training capacity that will be needed to grow this sector has, to some extent, been addressed as the demand for work experience and environmental skills increases. To achieve these broad objectives, Groen Sebenza Project has two key and interlined components. The first component builds on WESSA's experience in implementing work-integrated learning and meaningful work experience within the natural resource guardianship landscape, and the second builds on WESSA's experience as an accredited training provider in the environmental sector. For the green economy to grow, environmentally skilled people at many different levels are needed which, in turn, will require a substantial increase in environmental training to equip potential new entrants into this growing field. For the past 10 years WESSA has worked with the Department of Environment Forestry and Fisheries to build the basis for the provision of quality training in this field.[80]

There are several institutions in South Africa that offer green technology training, for instance, the South African Renewable Energy Technology Centre (SARETEC) which is the first national renewable energy technology centre in South Africa and the GREEN Solar Academy which offers training courses on solar installation.

3.1.7 Environmental Sector Skills Plan (ESSP)

In Section 24 of the South African Constitution (1996), the Department of Environmental Affairs (DEA) is mandated to ensure effective management of the country's natural resources and environment for socio-economic sustainability for current and future generations. An assessment of skills demand and supply for the environmental sector culminated in the Environmental Sector Skills plan (ESSP) which provides the best information on scarce and critical skills from a supply and

78 PAGE (2017), *Green Economy Inventory for South Africa: An Overview*. Pretoria. South Africa.

79 Retrieved from https://wessa.org.za/

80 Ibid.

demand perspective.[81] Education is recognised as strategic and the DFFE cooperates with key role players such as the Department of Education, the South African Qualifications Authority (SAQA) and the Sector Education and Training Authority (SETAs) to, amongst other objectives, review the environmental curriculum linked to sector demand. In addition, the ESSP identifies new trends in skills development needs and provides guidance on improving skills development planning and implementation within the national education, training, and skills development systems. Skills comprise the occupations, knowledge, values, and skills required to fulfil environmental mandates. The ESSP distinguishes between three categories of skills namely, high, intermediate and entry level skills which are represented on different levels of the National Qualifications Framework (NQF). The integration of the environmental economy into national skills development planning, strategy, and human resources development frameworks is vital. The Department of Employment and Labour (DEL) distinguishes between scarce skills (occupations with a scarcity of qualified and experienced people) and critical skills (specific skills within an occupation which include generic skills and particular occupational skills). Skills demand is identified by considering vacancy rates over a trend analysis period of five years and when the vacancy rates exceed 5% severe skills shortages are identified. With its linkages to several human capital development strategies nationally, the ESSP has played an influential role in design elements. Employment data is an invaluable indicator of skills demand and supply in the green economy. Statistics on environmental employment are reflected according to employer categories, namely, public, private and the not-for-profit sector as well as parastatals.

According to the ESSP, accurate data on environmental employment is constrained by inadequate statistical information. Notwithstanding this constraint, the data does provide some insight into environmental employment trends. The ESSP enumerates four sectors in its environmental employer profile and acknowledges environmental employment as a “significant new area of employment in the country”.[82] The public sector (21%) is a sizable employer of environmental skills, and the type of skills include technical, management and scientific skills. Remarkably, public sector environmental employment is largely evidenced in national departments in the economic cluster and incorporates high, intermediate and entry level skills. The bulk of environmental employment at local government level is at entry level.

The private sector (64%), including the SME sector, evidently, is the primary employer of environmental skills. Research and Development (1%) and environmental NPOs (14%) have also been included in the consolidated calculation.

[81] Department of Environmental Affairs (DEA), 2010 (now called Department of Forestries, Fisheries and the Environment (DFFE).
[82] Ibid, 2016, 9-11.

Furthermore, the ESSP identifies five core drivers of green skills supply and demand. These drivers are policy, macro-economic, macro- ecological, skills systems as well as science, technology, research, and innovation. Policy and regulation are pivotal in environmental skills demand and supply and structural changes in employment and occupations are thus inevitable. A suite of legislation in South Africa, such as the Environmental Management Act, (No. 102 of 1998), the Water Act (No. 36 of 1998), the Biodiversity Act (No. 10 of 2004) and others, form the building blocks of an environmental legislative framework and thus establish particular skills demand such as risk assessment, monitoring and evaluation, specialist scientific and management skills, integrative and predictive skills as well as specific technical skills. Collaboration between and across role players is essential if the environment is to be integrated into the economy.[83] On a macro- economic level, a Green Economy Summit and Green Economy Plan would pave the way for greater environmental sustainability and a transition to a low carbon economy.

The second Industrial Policy Action Plan (IPAP 2) postures the emergence of a green economy through increased economic activity in the green industry sector towards cleaner industries with lower environmental impact. However, green economy development is not matched with skills planning. Other macro-economic drivers that influence skills demand relates to valuing resources, green fiscal reforms and quantifying environmental costs. Seemingly, the rapid growth of the environmental goods and services sector is driving the need for environmental skills.[84] On the macro-ecological front, persistent environmental degradation, and its adverse impact on human well-being, effective service delivery and future development and growth, amplifies the demand for new skills in environmental management, risk and opportunity assessment and compliance management and monitoring. The ESSP stresses the importance of environmental education and training skills in higher education, TVET and basic education as well as workplace learning contexts. Climate change has highlighted the importance of risk prediction and risk management skills, sustainability innovation, systems analysis, building system resilience and adaptive management. Inter- disciplinary skills as well as a proactive, futures-thinking approach to skills development are indicated. Given the historical difficulties and the overall quality of education and training systems, an improvement in the quality of skills development is critical. The loss of youth potential entering the environmental sector is directly linked to the overall quality of schooling and this focuses the lens on the quality of science and environmental education. Thus,

83 Ibid 2016: 12.

84 Ibid 2016: 14-16.

systemic issues and other factors such as a lack of foundation in learning, poverty, hunger, and a lack of teacher knowledge can be attributed to the poor quality of education. The skills system drives the need for expertise in strengthening the environmental focus in the curriculum.

High level scientific and technological skills are crucial in the burgeoning development era and the enormous amounts of funds available for this demonstrates how these skills are indispensable. Science, technology, and research are significant drivers of skills demand in the environmental sector. The Department of Science and technology envisions South Africa becoming a world leader in climate science and earth system sciences and developing a knowledge economy and accelerating skills development in environment-related issues is therefore crucial.

The ESSP also indicates a number of key areas of skills demand that are essential for service delivery and competitiveness in both the public and private sectors which are broadly summarised here: continuous supply of environmental leadership; environmental scientific related occupations; environmental technical skills; transformation related skills; environmental education and training skills; youth development skills; skills for the full sustainable development value chain and critical environmental skills. The priority skills development identified in the latter category are in risk management, law and policy, monitoring, project management, ICT and GIS, ethics and social justice, green procurement and green economy planning and sustainable development.

The supply of skills to the environmental sector has been impacted by the relative newness of environmental policy and knowledge. The ESSP showed that across the South African education system, the introduction of environmental education has been inadequate, as the trend was to 'infuse' the environmental knowledge into mainstream disciplines and courses. In the General Education and Training band, teacher competence and knowledge development in environmental change was not prioritised. This lack was evident in the inability to train educators in the new knowledge areas and the fact that only 16 of the 23 higher education institutions in SA had some form of environmental education on offer and a general absence of specialisation in environmental education. The trend continued in the Further Education and Training college system with curricula bearing little reference to environmental skills needs and a lack of environmental knowledge amongst lecturers.[85] Furthermore, the Sector Education and Training Authority (SETA) system was shown to be underutilised in that environmental learnerships were significantly low with only a 2.4% uptake. Workplace skills planning and provisioning were often simplistic and dominated by short courses whilst there was little evidence of an

[85] ESSP, 2016: 28.

emergent focus on environment and sustainable development in university teaching programmes. As in the case of workplace skills planning and provisioning, the Higher Education sector's response was also *ad hoc*, dependent on lecturers' interest and not needs driven.

However, the ESSP data is relatively old, covering the period 2007/2008. According to the DFFE, the ESSP document has not yet been reviewed and several other sources report on skills development for a green economy, for example, the SANBI biodiversity Human Capital Development Strategy (BHDCS), a recent review of the Biodiversity Skill and Transformation Strategy.

3.1.8 Development of inclusive skills related to diversity, work environment.

The green economy discourse is complex and there are many gaps in our knowledge. Whilst skills supply and demand remain central in the discourse, social issues of diversity, inclusivity and equity have been peripheral. However, the green economy presents an ideal opportunity for social inclusion. The hegemony of a male-dominated, racially prejudiced, traditional economy created many social problems, alienation, and prejudice and approaches to social inclusion in the green economy can be diversified. Environmental justice and environmental knowledge frameworks are essential in perceptions of environmentalism. According to a study by Teelucksingh (2018),[86] little consideration is being given to how marginalised workers seeking employment in the green economy can negotiate their understanding of the environment. To address this gap, an environmental justice framework was used to examine perceptions of environmentalism and how it aligns with the green economy labour market. The study recommends the inclusion of diverse approaches to environmental knowledge as a move towards social inclusion. Green inequities, socio-environmental injustice and marginalised communities are deeply intertwined, and such discourse needs to centre on equality, access, and fairness. The exclusion of marginalised communities should offer protection from environmental racism, green inequities, climate injustice, and lack of access. Other dimensions include racial gatekeeping, nature deprivation in low-income communities, green gentrification, light pollution, and access to clean water.[87]

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[86] Teelucksingh, C. (2018). Diverse environmentalism and inclusivity in Toronto's Green Economy. *Environmental Sociology,* Vol. 5, (1), pp.47-58.

[87] Hicks, A.S., Malone, Z., Moore, M., Powell, R., Thompson, A., Whitener,P. & Williams, R. (2021). *Green inequities: Examining the dimensions of socioenvironmental injustice in marginalised communities*. Parks Stewardship Forum.

3.2 Kenya

3.2.1 Socio-economic context

Over the past decade, Kenya has implemented significant political and economic reforms, leading to sustained economic growth, social development, and political stability. However, challenges of poverty, inequality, youth unemployment, transparency, accountability, climate change, weak private sector investment, and susceptibility to internal and external shocks persist.[88] Between 2015 and 2019 Kenya achieved an average annual growth of 4.8%, reducing poverty from 36.5% in 2005 to 27.2% in 2019.[89] The COVID-19 pandemic hit the economy hard in 2020, disrupting international trade, tourism, and urban services. Nevertheless, the agricultural sector remained resilient, limiting the GDP contraction to only 0.3%. In 2021, the economy recovered, growing at 7.5%, although tourism and other sectors faced pressure. Projections indicate a good GDP growth in 2023, with the poverty rate resuming its decline after a temporary increase during the pandemic.[90]

The economic outlook remains uncertain due to Kenya's exposure to global price impacts such as those affected by the Ukraine war. The likelihood of civil strife because of food and energy-fueled inflation amid an environment of heightened political instability is a real threat.[91] The country has been grappling with high levels of unemployment, particularly among the youth. Secondary school and college graduates, approximately 1.54 million people within the 20 to 29 age group have been severely affected. The Kenya National Bureau of Statistics (KNBS) estimates that the number of jobless individuals in Kenya increased to over 2.97 million during the quarter ending in December 2022. Kenya, like other countries in the region, has also experienced a severe drought that affected its agricultural sector.

Unemployment not only affects individuals and households but also has wider implications for the environment.[92/93] The lack of employment opportunities leads to increased pressure on natural resources as people turn to activities such as illegal logging, poaching, or unsustainable farming practices for survival. In rural areas,

88 World Bank Country Profile, Kenya. Retrieved from https://www.worldbank.org/en/country/kenya/overview#1

89 Retrieved from https://www.worldbank.org/en/country/kenya/overview

90 Article: *Kenya's economy is recovering from the polycrisis, but challenges remain.* Retrieved from https://www.worldbank.org/en/news/press-release/2023/06/07/kenya-afe-economy

91 Retrieved from https://www.chathamhouse.org/2023/01/africa-2023-continuing-political-and-economic-volatility

92 Psycharis, Y. & Nijkamp, P. 2011. Unemployment and the Environment: A Survey of the Literature. *Ecological Economics.*

93 Kahn, M.E. The Environmental Impact of Unemployment: Evidence from the United States. *Journal of Environmental Economics and Management, 2010.*

where employment options are limited, individuals may resort to exploiting the environment for subsistence.[94]

Moreover, unemployment can hinder the adoption of environmentally friendly practices and technologies. Individuals without job prospects may lack the means to invest in renewable energy sources or eco-friendly technologies, leading to a continued reliance on fossil fuels and other environmentally harmful practices.[95]

Addressing unemployment is crucial for both the well-being of individuals and for sustainable environmental management. Creating job opportunities, particularly in sectors that promote environmental sustainability such as renewable energy, conservation, and eco-tourism, can contribute to both economic growth and environmental preservation. Additionally, investing in skills development and entrepreneurship programmes can empower individuals to become agents of positive environmental change while also improving their livelihoods. The population is growing and is currently 55,100,586, a 1.99% increase from 2022. Population growth affects utilisation of resources and sectors such as agriculture where production is intensified. This population growth puts more pressure on the environment and will have disastrous consequences if mitigation measures are not implemented.[96] It is estimated that 42% of Kenya's GDP and 70% of overall employment is derived from natural resource related sectors, including agriculture, mining, forestry, fishing, tourism, water supply and energy.[97] There is a need to enhance green jobs and green skills to avoid further devastation of the environment.

3.2.2 Policy and Regulatory Framework on Green Entrepreneurial Skills for SME Development

Kenya has an established policy and regulatory framework to promote green skills and jobs. The country's Vision 2030 and the Green Economy Strategy and Implementation Plan (GESIP) and The National Climate Change Action Plan (NCCAP), provide a roadmap for transitioning to a green economy and highlight the importance of green skills development and climate change mitigation and adaptation. Several laws have been enacted to promote a green economy, namely, the Energy Act, 2019; the Climate Change Act, 2016; and the National Environment Management Authority (NEMA) Act, 1999, amongst others.

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94 Anagnostou, M., Moreto, W.D., Gardner, C.J. & Doberstein, B. (2021). Poverty, Pandemics, and Wildlife Crime. *Conservation & Society*, Vol. 19, (4). (2021), pp. 294-306.

95 Wind Solar Hybrid Renewable Energy System: Eds. Kenneth Eloghene Okedu, Ahmed Tahour and Abdel Ghani Aissaou

96 *Assessment of green solutions and jobs in the selected value chains*

97 *Draft national green fiscal incentives policy: Framework of the Republic of Kenya*. National Treasury and Economic Planning 2022.

Kenya Vision 2030,[98] the country's long-term development blueprint emphasises the importance of green practices and seeks to promote resource efficiency, sustainable energy sources, and environmental conservation. The policy also recognizes the significance of green skills and job creation to support the green economy. Whilst acknowledging climate change impacts and prioritising climate resilience and mitigation measures,[99] the vision underscores Kenya's commitment to integrating sustainability across sectors, fostering economic growth, and addressing environmental challenges. The government's inclusion of mainstreaming the green economy in its Second Medium Term Plan (2013-2017) and integration of SDGs in the Third Medium Term Plan (2018-2022) further reinforces its commitment.

The GESIP guides Kenya's transition to a sustainable path in five thematic areas, namely, sustainable infrastructure development; building resilience; sustainable natural resources management; resource efficiency; and social inclusion and sustainable livelihood. It promotes green skills and jobs in sectors like renewable energy, sustainable agriculture, waste management, and eco-tourism. GESIP facilitates the development of green businesses and provides training and capacity building in green sectors. It emphasises the integration of green economy initiatives across economic, social, and environmental aspects.[100] The NCCAP 2018-2022[101] outlined Kenya's strategy for climate change mitigation and adaptation and identified key sectors for intervention, including energy, agriculture, water resources, and transportation. The plan emphasised the promotion of green technologies, energy efficiency, sustainable land use practices, and climate-resilient infrastructure. It also sought to create green jobs and enhance the capacity of individuals in climate change-related fields. Notably, the NCCAP emphasises actions for adaptation and establishes a National Policy on Climate Finance (2018) to mobilise climate finance from various sources. Despite these efforts, the government acknowledges the necessity for additional green fiscal policies to foster a low-carbon, climate-resilient, and sustainable development pathway, recognizing their potency and significance in shaping the desired green future.

In addition to planning frameworks, Kenya has established laws that support the transition to greener jobs and skills. The Energy Act, 2019,[102] focuses on promoting and developing renewable energy sources, encouraging the use of renewable energy technologies, and providing training and capacity building in the renewable energy

98 Retrieved from https://vision2030.go.ke/

99 Kenya National Adaptation Plan. 2015-2030. *Enhanced climate resilience towards the attainment of Vision 2030 and beyond.*

100 Retrieved from https://www.iisd.org/projects/*kenya-green-economy-strategy-and-implementation-plan*

101 Retrieved from https://faolex.fao.org/docs/pdf/ken190169.pdf

102 Energy Act: retrieved from http://kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/2019/EnergyAct__No.1of2019.PDF

sector. The Climate Change Act, 2016 and its Amendment bill 2023, [103] addresses climate change by promoting adaptation and mitigation strategies, including the adoption of green technologies and practices, and emphasises capacity building in climate change-related sectors. The Environmental Management and Co-Ordination Act, 1999[104] established the National Environment and Management Authority (NEMA) as the regulatory body responsible for environmental management through environmental impact assessments, enforcement of environmental standards, and promoted the adoption of environmentally friendly practices across industries.

On January 30, 2023, the Kenyan government released a draft National Green Fiscal Incentives Policy Framework[105] for public discussion which covers a wide range of topics, including policy objectives and guiding principles, situational analysis of green fiscal reforms in Kenya's core industries, and green fiscal policy initiatives. Among the primary policy mechanisms proposed are a carbon tax, rebates, subsidies, tax exemptions, ecological fiscal transfers, research grants, concessional loans, guarantees, interest rate subsidies, and the establishment of a green bank.

Effective policy implementation and enforcement are required to ensure that policies produce actual results.[106] Green skills and job promotion must be better integrated into larger national development plans and strategies to establish a more holistic approach. Bridging the skills gap between formal education and the demands of the green job market is critical, necessitating regular assessment, industry collaboration, and practical training.[107] To ensure that underrepresented groups have equal access to green skills and career opportunities, inclusivity and equality must be addressed and to assess efficacy and make necessary adjustments, robust monitoring and evaluation procedures are required. Opportunities for future improvement include strengthening public-private collaboration, investigating creative financing mechanisms, and boosting collaboration, continual engagement, innovation, and international cooperation. Inclusivity and representativeness, particularly for women,

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103 *Climate-change-amendment-bill-2023*: retrieved from https://www.environment.go.ke/wp-content/uploads/2023/03/26.3.23-CLIMATE-CHANGE-AMENDMENT-BILL-2023.pdf

104 Environmental Management and Co-ordination Act: retrieved from http://kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/EnvironmentalManagementandCo-ordinationAct_No8of1999.pdf

105 *National Green Fiscal Incentives Policy Framework*: retrieved from https://www.ey.com/en_gl/tax-alerts/kenya-publishes-draft-national-green-fiscal-incentives-policy-fr

106 United Nations Environment Programme (UNEP) - *Green Jobs in Kenya*. Retrieved from: https://www.unenvironment.org/regions/africa/regional-initiatives/green-jobs-programme-eastern-africa/green-jobs-kenya

107 International Labour Organization (ILO) - *Green Jobs in Kenya*. Retrieved from: https://www.ilo.org/africa/countries-covered/kenya/WCMS_224113/lang--en/index.htm

youth, and marginalised communities, who may face barriers, remain crucial.[108] To boost SME growth in the industry, supportive policies that promote diversity, inclusivity, and green business incentives must be implemented.

3.2.3 Green Skills Training

Kenya recognizes the importance of raising awareness about green skills and job opportunities. The government, together with civil society organisations and media outlets, regularly conducts campaigns to educate the public about the benefits of green jobs, the skills required, and the potential career paths. These efforts aim to change perceptions, promote sustainability, and inspire individuals to pursue green careers. Specific initiatives in Kenya focus on raising awareness about green jobs and promoting understanding among the general population. Kenya has developed training programmes and initiatives that focus on equipping individuals with the necessary skills for green jobs. These programmes cover a wide range of sectors, including renewable energy, energy efficiency, waste management, sustainable agriculture, and eco-tourism. The government, along with development partners and institutions, offers vocational training, apprenticeships, and certifications to individuals in green technologies and practices. The Kenya Climate Innovation Center (KCIC)[109] provides training programs and mentorship to entrepreneurs in the clean technology sector, with a focus on renewable energy, agribusiness, water management, and waste management. The Kenya Industrial Training Institute (KITI)[110] offers vocational training in green sectors such as solar energy installation, biogas technology, sustainable agriculture, and eco-tourism. The Greening Kenya Initiative,[111] led by the Ministry of Environment, Climate Change and Forestry, collaborates with NGOs, private sector companies, and international organisations to train and empower individuals in green skills. The Sustainable Energy for All (SE4ALL) Program,[112] in partnership with the government, implements training programs to enhance technical skills in the renewable energy sector, including solar panel installation and maintenance. The Kenya Renewable Energy Association (KEREA)[113] conducts training workshops and capacity building programs for technicians and professionals in various renewable energy fields. The Green

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[108] Retrieved from: Building the Green Econo (Placeholder2)my: Trends and Opportunities for Green Entrepreneurship in Kenya

[109] *Kenya Climate Innovation Center* (KCIC). Retrieved from: https://www.kenyacic.org/

[110] Retrieved from: https://kiti.ac.ke/

[111] Retrieved from: https://www.environment.go.ke/greening-kisumu-initiative/

[112] *Sustainable Energy for All* (SE4ALL). Retrieved from: https://www.afdb.org/en/topics-and-sectors/initiatives-partnerships/sustainable-energy-for-all-se4all

[113] Retrieved from: Kenya Renewable Energy Association : http://kerea.org/

Technical and Vocational Education and Training (TVET) Program,[114] implemented by the Ministry of Education with support of United Nations Educational, Scientific and Cultural Organization (UNESCO) together with, the International Centre for the Technical and Vocational Education and Training (UNEVOC) provide knowledge and develop skills that ease transition to green economies and societies. Additionally, the Kenya Wildlife Service (KWS) conducts training programs to develop skills in wildlife conservation, environmental management, and eco-tourism, contributing to the growth of the green economy.[115]

Kenya has also developed several technical training institutes across the country that provide a wide range of courses and programs to build skills for green sectors. Rift Valley Technical Training Institute (RVTTI) is a renewable energy training institute that focuses on solar panel installation, energy efficiency, and conservation. Kenya Coast National Polytechnic (KCNP) focuses on sustainable agriculture and agribusiness, encouraging environmentally friendly farming techniques and adding value. The Nairobi Technical Training Institute (NTTI) provides waste management and recycling courses, preparing students for careers in waste segregation, composting, and waste-to-energy technologies. Kenya Water Institute (KEWI) offers training in water management and conservation, such as rainwater gathering and water treatment. Kisumu National Polytechnic (KNP) offers eco-tourism and hotel management programs, with an emphasis on sustainable tourism practices. The Nyeri National Polytechnic (NNP) specialises in forestry and conservation, whilst the Machakos Institute of Technology (MIT) focuses on renewable energy technologies. Kenya Institute of Organic Farming (KIOF) provides organic agriculture training, whereas Thika Technical Training Institute (TTTI) focuses on renewable energy systems. Eldoret National Polytechnic (ENP) specialises in environmental science and conservation, Mombasa Technical Training Institute (MTTI) specialises in marine, and fisheries technology, Kenya Institute of Biotechnology Research and Development (KIBR) specialises in biotechnology, Meru National Polytechnic (MNP) specialises in sustainable construction, and Kiambu Institute of Science and Technology (KIST) specialises in environmental studies and natural resource management. Collectively, these institutes contribute to the creation of a trained workforce capable of driving sustainable development and supporting Kenya's green economy.

Whilst Kenya's efforts to develop green skills for green jobs have progressed well, there remain a few areas for improvement. There is a need to expand the reach and

[114] *The Green Technical and Vocational Education and Training (TVET) Program*. Retrieved from: https://unevoc.unesco.org/up/gtg.pdf

[115] *Kenya Wildlife Service* (KWS) Training Institute. Retrieved from: https://www.kws.go.ke/content/kenya-wildlife-service-training-institute

accessibility of training programs, particularly in rural areas and among marginalised communities.[116] Ensuring close alignment with industry needs and incorporating practical training and hands-on experience can enhance the relevance and employability of trainees. Robust monitoring and evaluation mechanisms are necessary to assess program effectiveness. Inclusivity and gender equality should be promoted, and opportunities for lifelong learning and skill upgrading should be offered to meet evolving sector demands. Further engagement with the private sector can enhance program outcomes.

3.2.4 Green Entrepreneurship and SME Support

SMEs are essential for economic growth and development and play a crucial role in job creation, and innovation. SMEs are responsible for creating more than 50% of jobs in many countries. They also contribute significantly to exports and GDP. SMEs are also a source of innovation and creativity, as they are more flexible and adaptable than larger companies. In Kenya, SMEs create 80% of employment, contribute to establish a new middle class, and stimulate the demand for new goods and services. Most SMEs fall under the informal sector which is estimated to constitute 98% of business in Kenya, contributing 30% of jobs and 3% of Kenya's GDP.[117]

Kenya has taken steps to promote green entrepreneurship and support SMEs in the country. Through various programmes and incentives, the government, non-profit organisations, and private sector partners are providing funding, mentorship, and technical support to businesses focusing on sustainable solutions. These initiatives aim to foster innovation, promote sustainable industrial development, and address climate change and sustainability challenges. One notable programme is the Green Innovation and Entrepreneurship Hub (GreenHub), launched by the Ministry of Environment and Forestry, which serves as a platform for green entrepreneurs to access business development services, training, and networking opportunities. It offers mentorship and incubation programs that support the growth of sustainable start-ups. Similarly, the Kenya Climate Ventures (KCV) venture capital fund invests in businesses addressing climate change and sustainability challenges, providing financial support and technical expertise to early-stage and growth-stage companies in sectors such as renewable energy, energy efficiency, and waste management. The KCIC offers incubation and acceleration programs for green entrepreneurs.[118] Additionally, the United Nations Industrial Development Organization (UNIDO) -

116 *Green Skills and Sustainable Economy in Kenya: The Influence of TVET Trainer Competencies*. Retrieved from: file:///C:/Users/Abel%20Sauti/Downloads/Africa%20Journal%20of%20TVET.pdf

117 *Kenyan SMEs to contribute 50pc of GDP in next three years.* Retrieved from: https://www.businessdailyafrica.com/bd/corporate/marketplace/kenyan-sme-to-contribute-50pc-of-gdp-in-next-three-years--3836534

118 *About Kenya Climate Innovation Center*. Retrieved from: https://www.kenyacic.org/

Kenya Cleantech Program[119] supports the development and growth of clean technology start-ups by providing funding, mentorship, and technical assistance.

Technical support and advisory services are also available through institutions like the Kenya Industrial Research and Development Institute (KIRDI).[120] KIRDI assists entrepreneurs and small businesses in the green sector with product development, testing, certification, technology transfer, and commercialization. The Climate Technology Center and Network (CTCN)[121] collaborates with partners to offer technical assistance and capacity building for the deployment of climate technologies. There are limited opportunities for finances to fund green initiatives due to several factors, namely, low investor confidence in and lack of familiarity with green business models, predominantly international funding sources, and limited climate financing directed to adaptation and resilience efforts.[122] Although Kenya has made commendable efforts to promote green entrepreneurship, there are still areas that can be improved to enhance their effectiveness. These include addressing challenges in accessing funding for green start-ups and small businesses. According to the World Bank, SMEs in Sub-Saharan Africa face a huge financing gap of US$330 billion.[123]

Efforts to enhance green entrepreneurship in Kenya therefore necessitate the following actions: expanding outreach and awareness about existing programs, offering comprehensive technical and business support services, integrating green entrepreneurship into formal education, ensuring inclusivity and gender-specific assistance, establishing effective monitoring and evaluation mechanisms, and fostering collaboration and partnerships among stakeholders. Addressing these gaps will accelerate green entrepreneurship, promote sustainable solutions, and facilitate Kenya's transition towards a green economy.

3.2.5 Green Technology Innovation

Kenya is promoting research and development in green technologies to support environmental sustainability and job creation. Initiatives include investments in renewable energy, sustainable transportation, and eco-friendly manufacturing processes. Examples of government-led programs include the Kenya Industrial

119 United Nations Industrial Development Organization (UNIDO): Retrieved from: https://www.unido.org/GCIP

120 Kenya Industrial Research and Development Institute (KIRDI). Retrieved from: website https://www.kirdi.go.ke/

121 Climate Technology Center and Network (CTCN) Country profile - Kenya https://www.ctc-n.org/ctcn-countries/ke

122 "Building the Green Economy: Trends and Opportunities for Green Entrepreneurship in Kenya Retrieved from: https://andeglobal.org/publication/green-entrepreneurship-in-kenya/

123 Retrieved from: https://www.businessdailyafrica.com/bd/corporate/marketplace/kenyan-sme-to-contribute-50pc-of-gdp-in-next-three-years--3836534

Research and Development Institute (KIRDI),[124] the Renewable Energy Feed-in Tariff (REFIT) Policy, the Geothermal Development Company (GDC),[125] the Green Mini-Grids Program,[126] and the Electric Mobility Program.[127] However, challenges remain, such as funding constraints, limited collaboration, skills and capacity gaps, and the need for a supportive regulatory framework. On the other hand, opportunities lie in the country's innovation ecosystem, public-private partnerships,[128] technology and knowledge transfer and adaptation,[129] a circular economy approach,[130] and policy support.

3.2.6 Greening the economy through partnerships

Green jobs as defined by the International Labour Organization are those which contribute to preserving, restoring, and enhancing environmental quality by improving energy, raw materials, and water efficiency. New green businesses are expected to contribute to protecting and restoring the natural environment and reducing any harm caused to it. Kenya has recognized the importance of adopting green practices in the skills and job sectors to promote sustainable development and address environmental challenges and has implemented various initiatives to encourage collaboration between the public and private sectors in driving green skills and job creation. The government works closely with businesses, industry associations, and educational institutions to identify emerging green sectors and design training programs that align with industry needs. These collaborative efforts aim to promote knowledge sharing, resource mobilisation, and the development of green technologies. Specific examples of such initiatives include partnerships between the Kenya Association of Manufacturers (KAM)[131] and the Ministry of Industrialization, Trade and Enterprise Development, the Kenya Private Sector Alliance (KEPSA)[132]

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124 Kenya Industrial Research and Development Institute (KIRDI). Retrieved from: https://www.kirdi.go.ke/

125 Geothermal Development Company (GDC). Retrieved from: https://www.gdc.co.ke/

126 *Ground-mounted solar PV mini-grid project to connect 90,000 Kenyans to clean electricity for the first time*. Retrieved from: https://repp.energy/project/powerhive-mini-grid-kenya/

127 *The National Plan for the Development of Green Mobility*. Retrieved from: https://www.afrik21.africa/en/kenya-national-plan-for-electric-mobility-in-the-making-to-tackle-pollution/

128 *Kenya Green Economy Strategy and Implementation Plan (GESIP).* (Kenya Ministry of Environment and Forestry). Retrieved from: http://www.environment.go.ke/

129 Green Growth Knowledge Platform (GGKP). Retrieved from: https://www.greengrowthknowledge.org/

130 *Harnessing Technology in the Circular Economy for Climate Action in Africa.* Retrieved from: https://www.ctc-n.org/sites/www.ctc-n.org/files/CTCN_Circular_Economy_Africa_Fin.pdf

131 Kenya Association of Manufacturers (KAM). Retrieved from: https://kam.co.ke/

132 **K**enya Private Sector Alliance (KEPSA). Retrieved from: https://www.kepsa.or.ke/

and the Ministry of Environment and Forestry, and the Sustainable Energy for All (SEforALL) Initiative.[133]

Collaboration between the government and Technical and Vocational Education and Training (TVET) institutions has also been established to ensure that training programs align with the needs of the green job market. Furthermore, partnerships with renewable energy associations, such as the Kenya Renewable Energy Association (KEREA),[134] and initiatives like the Global Apprenticeship Network (GAN) Kenya[135] and the Partnership for Skills in Applied Sciences, Engineering, and Technology (PASET)[136] contribute to skill development and job creation in green sectors.

However, there are some gaps and opportunities that need to be addressed to enhance the effectiveness of these initiatives. Ensuring inclusiveness and reaching marginalised communities and regions, improving coordination and alignment among stakeholders, scaling up and sustaining impact, and implementing robust monitoring and evaluation frameworks are important areas of focus. Opportunities exist in strengthening the relevance of skills training, providing targeted support for SMEs, leveraging technology and innovation, enhancing partnerships, and addressing gender disparities.[137]

3.3 Nigeria

3.3.1 Socio-economic context

Nigeria is the most populous country in Africa and the sixth largest in the world with approximately 218.5 million people. It is estimated that by 2050, this figure could double to reach around 400 million people. There are over 250 ethnic groups, with more than 500 languages and approximately 50% of Nigerians live in urban areas. The official language is English, but many indigenous languages are spoken. Muslims and Christians are the predominant religions with indigenous religions in the minority.[138] Nigeria faces a range of pressing environmental challenges which pose significant threats to the country's natural resources, biodiversity, and socio-

[133] Sustainable Energy for All (SEforALL) Initiative. Retrieved from: https://www.seforall.org/

[134] Kenya Renewable Energy Association (KEREA). Retrieved from: https://kerea.org/

[135] Global Apprenticeship Network (GAN). Retrieved from: https://www.gan-global.org/

[136] Partnership for skills in Applied Sciences, Engineering and Technology(PASET). Retrieved from: https://www.worldbank.org/en/programs/paset

[137] Retrieved from: Building the Green Economy: Trends and Opportunities for Green Entrepreneurship (Placeholder1) in Kenya

[138] Retrieved from: https://en.wikipedia.org/wiki/Demographics_of_Nigeria

economic stability. Therefore, embracing a green economy framework has become crucial in steering Nigeria towards a more sustainable and resilient future. In addition, Nigeria also faces various challenges in its development stride and efforts to improve the quality of life of its citizens. There is a need to foster rapid, sustainable growth to cater for the needs of its large population as well as a need for proper integration of the economy into the world economy. Overcoming poverty, fighting corruption, meeting the basic needs of the people, inadequate and inefficient infrastructure, developing human resources and capital for sustainable growth and equity, sustainability of the country's environmental resources for the benefit of present and future generations are critical social challenges.

Nigeria's economy has grown continuously in recent years which bodes well for a new development trend and is vital for the socio-economic development strategy. Furthermore, the labour force of Nigeria is in a period of "golden population" with a tradition of hard working, simple living, and being in harmony with nature.[139] The concept of green growth has arisen after the start of the global economic recession in 2008.[140] Facing the global crises of economic recessions and climate change, international organisations and national governments have been structuring policies to encourage investments in industrial activities that reduce adverse impacts to the environment. Establishing these industries can provide economic growth through the creation of new industries, markets, and associated jobs. Green economy initiatives also hold promise for addressing the issue of unemployment in Nigeria, especially among the youth. By promoting green skills development and entrepreneurship, young people can be equipped with the knowledge and tools to engage in sustainable business ventures. Such ventures include areas such as renewable energy installation and maintenance, eco-tourism services, sustainable waste management, and green building practices. These opportunities can empower the youth to become active participants in the green economy, contributing to job creation and poverty reduction.

The integration of green skills into business education curriculum will propel students to set up innovative greener industries. This finding is consonant with the report of the World Bank (2012) which maintains that green skills are crucial for job creation and facilitate the creation of a low-carbon economy. Findings of the study revealed that business educators perceived that waste management and wealth regeneration skills as well as climate change and ecological consultancy skills are very much

139 Tram, P. T. (2015). *Changing the way to develop: Opportunities and challenges*. Retrieved from Vietnam Institute for Development Strategies:http://dsi.mpi.gov.vn/21/570.htmlGTF.

140 Barbier, E. B. (2013). *A new blueprint for a green economy*. Routledge.

needed in the business education curriculum for creating a sustainable society in Nigeria. Moreover, Oborah (2006) asserted that employment opportunities for graduates of business education include consultancy and entrepreneurial employment. These skills will enable graduates of business education to function effectively in the current highly competitive environment and strong market forces to turn business problems into business opportunities.[141]

3.3.2 Policy and regulatory framework

Nigeria has recognized the importance of a policy and regulatory framework to support the development of a green economy and address environmental challenges. The country has taken significant steps to create an enabling environment for sustainable practices and the transition to a low-carbon economy. The commitment to a green economy is reflected in the policy framework, including the Nigerian Development Plan (NDP) and the Nationally Determined Contributions (NDCs) submitted under the Paris Agreement. These policy documents outline the country's vision and strategic goals for sustainable development, setting the stage for the integration of green economy principles into various sectors of the economy. The transition to a green economy requires concerted efforts from multiple stakeholders and collaboration between the government, private sector, civil society organisations, and educational institutions. Investments in research and development, technology transfer, capacity-building, and skill development are vital to equip individuals and enterprises with the necessary knowledge and tools to participate in and benefit from the green economy.

The NDP also provides a strategic roadmap for sustainable development, emphasising the promotion of renewable energy, sustainable agriculture, waste management, and the conservation of natural resources. It sets the foundation for integrating green principles into national development priorities. Nigeria pledged an unconditional 20% reduction on Business as Usual (BAU) emissions by 2030, and a 45% conditional commitment which could be achieved with financial assistance, technology transfer and capacity building.

The NDCs also outline Nigeria's commitments to mitigating greenhouse gas emissions and adapting to climate change impacts and highlight the country's goals for achieving sustainable development while addressing climate change and emphasize the need to promote renewable energy, energy efficiency, afforestation, sustainable transportation, and sustainable waste management practices.

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141 Ezenwafor, J. I., & Olaniyi, O. N. (2016). Ratings skills needed by business education graduates for entrepreneurial development in Southwest Nigeria. *International Journal of Entrepreneurial Development, Education and Science Research*, 4(1), pp.165-177.

In addition to these overarching policy frameworks, Nigeria has implemented specific regulations and incentives to drive the adoption of green practices. For instance, the government has introduced the National Renewable Energy and Energy Efficiency Policy (NREEEP) to promote the use of renewable energy sources and enhance energy efficiency. This policy provides a framework for investment in renewable energy projects, sets targets for renewable energy deployment, and establishes guidelines for energy efficiency measures. Furthermore, the National Environmental Standards and Regulations Enforcement Agency (NESREA) is responsible for enforcing environmental regulations and promoting sustainable practices across various sectors. NESREA ensures compliance with environmental standards, waste management practices, and pollution control measures to safeguard the environment and public health.

The government has also implemented tax incentives and financial mechanisms to support the green economy. These include tax breaks, grants, and preferential loans for businesses engaged in renewable energy projects, energy-efficient technologies, and sustainable agriculture practices. These incentives aim to stimulate investment, foster innovation, and encourage the adoption of green practices. Overall, Nigeria's policy and regulatory framework for the green economy demonstrate the government's commitment to sustainable development and addressing environmental challenges and will enable Nigeria to create an enabling environment that promotes the growth of green industries, the adoption of sustainable practices, and the achievement of its green economy objectives.

3.3.3 Importance of SMEs in the Economy

Small and Medium Enterprises (SMEs) play a vital role in the economy of Nigeria and contribute to employment, social and industrial development, forming the very base upon which the big business organisations are built.[142]

SMEs have proved to be a major tool adopted by developed nations to attain socio-economic development. In developed countries, SMEs are recognized as the main engine for growth and development because of their significant contributions to economic growth and development. They also promote indigenous sources of growth and serve to strengthen the infrastructure for accelerated economic expansion and development.[143]

[142] Onakoya, A. B. O., Fasanya, I. O., & Abdulrahman, H. D. (2013). *European Journal of Business and Management*, 5(4), pp.130-136.

[143] Olaoye, C. O., Adedeji, A. Q., & Ayeni-Agbaje, R. A. (2018). Commercial bank lending to small and medium scale enterprises and Nigerian economy. *Journal of Accounting, Business and Financial Research*, 4(2),pp.49-55.

SMEs also fulfil important development roles in Nigeria as they have shorter gestation periods and, as a result, yield quicker returns on investment.[144] They employ a significant portion of the country's workforce, especially in sectors such as manufacturing, retail, and services. The flexibility and agility of SMEs allow for rapid job creation, which is essential for reducing unemployment rates and providing livelihood opportunities for many individuals. Furthermore, the proliferation of SMEs enables them to generate more employment opportunities than large businesses, often generating income for three distinct modes of the economy and thus contributing to poverty alleviation. This contribution is evident in the form of salaries paid to employees, profits made by entrepreneurs, and taxes and other statutory levies paid to the government, thus boosting and strengthening the Nigerian economy. Although SMEs may not generate as much income as large corporations do, they are critical components of and major contributions to the strength and growth of local communities.[145]

In addition, the role of SMEs in the development of Nigeria's economy has made it possible for firms to depend less on imported goods or materials as they often depend on locally made machines and local raw materials as inputs. According to Oshagbenius (1985), the non-dependence of the economy on imported raw materials has been beneficial for foreign exchange earnings and the balance of payment problems.[146] SMEs have also had a significant impact on entrepreneurship and innovation. Aginah et al (2013) assert that SMEs encourage self-employment for many youths, both in the rural and urban areas and that the spirit of successful entrepreneurship has taken over the mind of Nigerians, who believe in themselves and in the goal of self-employment, instead of relying on government jobs.[147] Thus, SMEs tend to attract talents who invent new products or implement new solutions for existing ideas.

3.3.4 Development of entrepreneurial skills

The development of entrepreneurial skills is crucial for fostering economic growth, innovation, and job creation in Nigeria. Recognizing the significance of entrepreneurship, several initiatives and programmes have been implemented to

144 Yewande, M. (1991). *The role of government in the development of small and medium scale enterprise in an economy*. Retrieved from: www.yourarticlelibrary.com/society /nationaldevt

145 Ugiagbe, M.A., Nwaogwugwu, N.C. & Obuseh, R. (2008). *Entrepreneurship: concept of small business management*. Owerri: Favoured House Concept.

146 Oshabenius, J. *The impact of small and medium scale enterprises in Nigeria economy*. Abraka: National Youth Service Corps (NYSC) College of Education, 1985).

147 Aginah, C, Oguguo, B & Nwokocha, E. *Essentials of entrepreneurship development in Nigeria*. Owerri: Great Stars Publishers, 2013.

nurture and enhance entrepreneurial skills in the country.[148] One notable initiative is the establishment of entrepreneurship development centres and institutions across Nigeria. These centres offer training programmes, workshops, and mentorship opportunities to aspiring entrepreneurs, equipping them with essential skills such as business planning, financial management, marketing, and leadership training.

In addition to formal educational institutions, government agencies, non-profit organizations, and private sector entities have launched entrepreneurship support programmes. These programmes provide funding, technical assistance, and access to networks and markets for entrepreneurs to start and grow their businesses. Furthermore, the Nigerian government has introduced policies and frameworks that promote entrepreneurship, such as tax incentives for small businesses, streamlined business registration processes, and the establishment of entrepreneurship development funds. To complement these efforts, entrepreneurship competitions, startup incubators, and innovation hubs have emerged in major cities, fostering a culture of entrepreneurship, and encouraging young people to pursue their business ideas. Overall, the development of entrepreneurial skills in Nigeria is vital for creating a vibrant and sustainable economy. By investing in entrepreneurship education, mentorship, and support systems, Nigeria can unlock the potential of its youth and drive economic development through innovation and job creation.

3.3.5 Greening of the Nigerian economy

The UNEP report defines a green economy as “one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.” The green economy is reinforced by three major pillars (1) low-carbon technology (2) resource-use efficiency and (3) socially inclusive growth. Such a framework is of particular importance to Nigeria which, as a populous and resource-rich country, recognizes the need to embrace the principles of a green economy to foster sustainable growth, mitigate climate change impacts, and achieve long-term environmental and social well-being. The severe poverty amid plenty and the extensive environmental degradation across Nigeria, are in many ways linked to a high dependence on the exploitation of natural resources in inefficient ways for livelihood activities, which reinforces the cycle of under-development.

[148] Olawande, T., & Yusuf, S. (2020). Green Skills and Sustainable Entrepreneurship in Nigeria. *Nigerian Journal of Technological Development,* 17(2), 91-97.

A shift to a green economy framework could therefore provide Nigeria with tremendous opportunities to profit from its rich natural resource endowments. Achieving the benefit of a green economy, however, will require the Nigerian government to put in place an institutional framework of which a functional and vibrant National council of Sustainable Development (NCSD) will be pivotal. For a smooth and successful transition to a green economy, Nigeria must also take full advantage of the report of the Trade Policy and Planning Unit of the UNEP. This report is a key component of the Green Economy and Trade Opportunities Project (GE– TOP) and lists the types of opportunities arising from the transition, namely, trade in environmental goods and services, standards and certification, and the greening of global supply chains.[149] The report also presents a comprehensive sectoral analysis. The necessity for greening products and processes is aided by growing opportunities for market desirability and added value. Sustainable agricultural methods can increase productivity and there will be a growing market for business-to-business trade in the verification and certification of production methods and goods. ·

Moreover, green energy represents a growing and potentially large industry, and emerging economies are becoming significant players in the trade in environmental goods and services. The report identifies the following five enabling conditions: strategic investment and spending in economic infrastructure, targeted education programmes, technical assistance and access to sustainable; market-based instruments where subsidies to unsustainable products must be reformed and environmental and social costs factored into pricing policies; improving national regulatory frameworks, transparency and accountability; international frameworks necessary for technology skills and resource transfer and dissemination and enhancing dialogue and capacity building by supporting trade opportunities that arise.[150]

3.3.6 Development of inclusive skills related to diversity, work environment

The development of inclusive skills related to diversity in the work environment is of utmost importance to Nigeria. With its diverse population encompassing various ethnicities, religions, languages, and cultural backgrounds, Nigeria stands to benefit considerably from inclusive practices that embrace diversity and create an equitable and harmonious work environment. Inclusive skills development entails nurturing attitudes, knowledge, and behaviour that promote respect, empathy, and understanding towards individuals from different backgrounds. By cultivating

[149] Retrieved from http://www.iiste.org

[150] *Journal of Resources Development and Management,* 2015, Vol.11.

inclusive skills, organisations in Nigeria can harness the diverse perspectives, talents, and experiences of their workforce, leading to enhanced creativity, innovation, and productivity. Promoting inclusive skills development involves several key aspects: First, organisations need to foster awareness and understanding of diversity and its value. This awareness can be achieved through diversity training programmes, workshops, and awareness campaigns that educate employees about different cultures, beliefs, and perspectives. Such initiatives can help break down stereotypes, biases, and prejudices, creating a more inclusive work environment. Second, effective communication and interpersonal skills are essential for fostering inclusivity. Encouraging open dialogue, active listening, and constructive feedback can facilitate understanding and collaboration among diverse team members. Developing cross-cultural communication skills and promoting empathy can bridge cultural gaps and strengthen relationships within the workplace. Third, leadership plays a critical role in driving inclusive skills development. Managers and supervisors need to serve as role models by exhibiting inclusive behaviours, demonstrating respect for diversity, and ensuring equal opportunities for all employees. Inclusive leadership involves empowering and involving employees, valuing their contributions, and fostering an environment of psychological safety where diverse perspectives are encouraged and respected. Lastly, organisations should establish policies and practices that promote diversity and inclusion. Such practices include fair recruitment and promotion processes, diversity-sensitive Human Resource policies, and support for work-life balance and employee well-being. Creating affinity groups, employee resource networks, and mentorship programmes can also contribute to inclusivity by providing support and fostering a sense of belonging for underrepresented groups.

Developing inclusive skills related to diversity in the work environment not only promotes social justice but also leads to tangible business benefits. By harnessing the power of diversity, organisations in Nigeria can tap into a wider talent pool, improve decision-making processes, enhance customer satisfaction, and better serve diverse markets.

In conclusion, the development of inclusive skills related to diversity is essential for creating a harmonious and productive work environment in Nigeria. By embracing diversity, fostering inclusive behaviours, and promoting equitable practices, organisations can unlock the full potential of their workforce and contribute to a more inclusive and prosperous society.

Chapter 4 Methodology

Our basic assumptions about climate change and the green economy influence the way we think as well as how we produce knowledge about these issues. Some of these assumptions relate to the role of entrepreneurship education, SMEs and education and training institutions in the just transition to a green society. As mentioned, this research study was primarily focused on TVET green entrepreneurial skills for SMEs with specific emphasis on the problem of skills demand for a green economy in three SSA countries. The purpose of the study was to conduct a regional study in South Africa, Kenya, and Nigeria on SME skills demand for a greener society with the objective of identifying the essential skills in these countries which will support innovation, design-thinking, and greening in SMEs. Since the analysis was limited to TVET institutions and the SME sector in these three countries, it is prudent to contextualise the research focus more broadly.

Climate change has a range of negative effects on the earth's resources. To mitigate these damaging effects, more responsible resource utilisation and low carbon emissions are needed. A green economy with low carbon emissions, resource

efficiency and socially more inclusive, is the best way to achieve more sustainable development. However, the requisite resources and skills for a green transition are not instantly available and there is a need for responsive and relevant skills development and a more equitable reallocation of resources. Skills development and capacity building must reinforce a greener and inclusive society. Moreover, the social dimensions of poverty, inequality, inclusivity, and unemployment must be a crucial part of the just transition.

The role of SMEs in the global economy is significant and widely acknowledged. More important is the role SMEs can play in mitigating economic, environmental, and social issues. As already mentioned, several tools and resources are used to support SMEs, namely, business incubation and acceleration, as well as skills development and training. In the same way that business incubation helps to promote and develop entrepreneurship and economic development, so too does skills training. Given the importance of the SME sector, the development of entrepreneurial green skills among SMEs is of utmost importance. To thrive in this diverse and interconnected, complex world, the youth and the SME sector need relevant skills sets. The changing nature of work, business, and the way we live requires new skills to navigate complexity and uncertainty. WorldSkills Vision 2025 identified three strategic goals: to cultivate ambition and opportunity in VET for young people, employers, and societies; to enhance the quality of VET provision through stronger connections to labour markets, employers, and economies; and to help build the organisational capability of WorldSkills and the global competitiveness of its members through skills. Skills for the 21st century also play a central role in supporting enterprises, irrespective of the sector or size, in their economic recovery and future competitiveness. Educational institutions like TVET institutions are thus also catalytic in advancing and embedding SME green entrepreneurial skill.

Since the objective was to identify essential skills in three SSA countries to support innovation, design-thinking and greening in SMEs, the overall research question was:

What is the nature and extent of SME skills demanded in SSA countries for a greener society?

The primary research aims were to:

(i) identify essential green skills for SMEs;

(ii) identify entrepreneurial green skills.

The secondary aims were to:

(i) analyse the factors impacting a green economy;

(ii) analyse the barriers to the development of green skills;

(iii) assess the responsiveness and readiness of TVETS in green skills for SME development.

Thus, the first primary research question was: **What are the essential green skills for SMEs?**

The questionnaire contained a series of questions related to 21st Century Skills in terms of their importance for a green economy. Twelve skills were identified and organised according to core and contextual skills: the importance and relevance of knowledge areas in a green economy; a definition of green skills; the Green General Skill Index consisting of groups of work tasks and green occupations; the six key skills for a green economy and the two crucial components of green skills; the priority skills in demand for the future economy. The questionnaire also made provision for self-assessment of knowledge and expertise of green skills.

The second primary research question was thus: **What entrepreneurial green skills are required by SMEs?**

The questionnaire series requested respondents to rate the importance of entrepreneurial skills for a green economy; the top skills of the year 2025 and their importance for SMEs in a green economy; and to give a self-assessment with motivation of the top three skills.

The study comprised two methods of data collection, namely, secondary research of existing studies and primary field research. Firstly, a literature review on the green economy, green society, education, and entrepreneurship was performed in each country. This review was followed by desk research and a secondary analysis of existing literature on VET green entrepreneurial skills in each country through data searches on the internet, reports and publications, newspapers, and other sources of information. The report was structured to depict the key features in each country with reference to the socio-economic context, policy and regulatory framework, the SME sector, development of entrepreneurial skills, greening of the economy, development of green skills, and specific environmental initiatives. Each country identified specific skills shortages for the growing SMEs. Thus, the field research was preceded by a review of existing surveys, academic data and strong engagement of universities, VET, and current enterprises.

Quantitative research entails an analysis of statistics for description and to make inferences about the meanings that underlie the data. It is a cold calculating process, applying deductive logic from the positing of a hypothesis to the supporting or not supporting of it.[151] The focus is on quantification of constructs by assigning numbers

[151] Leedy, P.D (1993). *Practical Research: Planning and Design*. 5th ed. New York: Macmillan Publishing Company.

to the perceived quality of things and linking constructs to observable measurement through operational definitions.[152] As an appropriate instrument for this type of research, a structured electronic questionnaire was distributed to the respondents to solicit their responses in a standardised way. By way of deductive analysis of such responses, the aim was to use this quantitative data to test theories emanating from the literature. Quantitative research is often criticised for its inability to uncover the meanings of social action as it seemingly does not consider the role of consciousness, values, and goals in social action. It is also often regarded as too scientifically rigid and overly focused on statistics. However, as the purpose of this aspect of the study was to assess known factors, the quantitative approach was deemed useful.

SMEs and TVETS were surveyed by means of a structured questionnaire on Google Forms prepared by SADRAT and shared with PRIZMA, EKS, Eduforma and project partners from Kenya and Nigeria, who provided their feedback and, after a few iterations, approved it for dissemination. To obtain reliable data, the measuring instrument consisted of a series of Likert-scale questions. The questionnaire was subjected to the critique of experts familiar with the nature and scope of the study and principles of question construction. In addition, the standardised wording of the questionnaire was important to ensure consistency and provided more accurate and honest responses. Each partner country disseminated the questionnaires and links to the SMEs and TVET institutions. A total of 50 completed questionnaires were required for the purposes of this research project, but a higher number were distributed due to the low response rates normally associated with web-based surveys.

Cognisant of the intrinsic size of each country and their SME sector as well as the number of project partners, the following requirements were agreed upon by the implementing partners:

- 10 questionnaires to be completed by South Africa (SADRAT)
- 10 questionnaires to be completed by Kenya (Ustadi)
- 30 questionnaires to be completed by Nigeria (Egunec Foundation, Yadaversity, Center for Digital Skill Acquisition for Women and Youth in Africa)

The criteria for the SMEs were determined based on the literature. The Small Business Institute in South Africa (SBI) was approached to participate in the survey.

[152] Babbie, E & Mouton, J. (2001). *The practice of social research*. Cape Town: Oxford University Press.

The SBI is a Business Chamber organisation and represents 79 chambers nationally. The institute is the biggest organisation for SMEs in South Africa and is an 81-year-old, not-for-profit organisation and a member of Business Unity South Africa (BUSA), the largest body for organised business in SA. The institute was constituted to promote the economic and business interests of South Africa's chamber organisations and thousands of SMEs in the wider economy and stands for sustainable, market-led job creation, inclusive economic growth, transformation, and ethical leadership.

The SBI has a combined membership of more 100 000 SMEs as members according to an audit conducted two years ago. Although several other organisations are involved with SMEs, the SBI is one of the most prominent organisations that support SMEs in South Africa and exists to positively influence the environment for SMEs in South Africa. It provides a big voice for small businesses and offers non-financial support to small enterprises, including training, mentorship, and market access. Other organisations that support SMEs in South Africa include the National Empowerment Fund (NEF), the Industrial Development Corporation (IDC), Business Partners Limited, and the South African Institute for Entrepreneurship (SAIE).

The selection criteria for participants of this study were:

- be registered member of the SBI
- be defined as a small or medium enterprise
- be independently/ privately owned and controlled
- have an annual turnover of:

  medium: less than or equal to: R35m

  small: less than or equal to: R17m
- with the number of employees:

  medium: 51- 250

  small: 11- 50

The criteria of the annual turnover and the number of employees were based on the national criteria as published by the Department of Small Business in the Government Gazette, 2019. A total of 180 questionnaires were distributed to SBI members in all the major provinces in SA and some of the smaller provinces. A total of 91 SMEs that complied with the criteria were identified for the survey and the questionnaire link was disseminated geographically as follows: Gauteng 52, Western Cape 15, Other provinces 24.

Questionnaires were also distributed to the Ahi, a smaller organised chamber for small business. The Ahi has been working with small businesses and entrepreneurs for more than 75 years. As an organisation representing small business chambers, the Ahi largely operates in the Western Cape.

There are 52 TVET colleges in SA and all were invited to participate. The questionnaire was disseminated to the Head or Principal of each TVET around the country. South Africa's public TVET colleges have more than 700,000 students and continue to expand in popularity and student numbers. The Department of Higher Education and Training has approved these colleges and oversees them. The colleges concentrate on vocational and occupational education and training with the goal of preparing students to work in a skilled trade as functioning workers. Unlike universities, which require a bachelor's degree, TVET colleges allow students who have completed Grades 9, 10, 11, or 12. Some colleges have up to 300 distinct courses from which to choose. The National Certificate (Vocational), NATED, Report 191, NQF Full Time, and Learnerships are examples of these.

The structured questionnaire required respondents to give an account of their perceptions of skills supply and demand. In total 64 respondents comprising TVETs and SMEs across the national spectrum of the three SSA countries completed the questionnaire. Although the response rate was low, one can assume that non-participation was not systematic and did not form any pattern so as to cause a bias in the results. Survey fatigue appears to be the main reason for non-response. The low response has been a limitation in the study, and it is suggested that another similar study be undertaken.

The implementing partners agreed to statistical analysis of the data on a regional basis with a consolidated report for the SSA region. The statistical description of the respondents' perceptions of skills demanded involved collecting, reviewing, analysing, and presenting the numerical data. Statistical services were procured by SADRAT. An Emeritus Professor was appointed as Statistician and mandated to conduct the data analysis. Data was imported into the Excel spreadsheet from the online questionnaires, and then into the IBM SPSS programme which was used to analyse them. The answers to the questions posed to the respondents were coded using numbers from 1 to 7 on the following scale: Very unimportant (Strongly Disagree)=1, Unimportant (Disagree)=2, Slightly unimportant (Somewhat disagree=3, Neutral (Neither agree nor disagree)=4, Slightly important (Somewhat agree)=5, Important (Agree)=6, and Very important (Strongly agree)=7.

Data coding allowed for easy extraction of the meaning and essence of the responses provided. This enabled the researcher to categorise and summarise the data to answer the research questions. The data reports were arranged and organised

according to the research questions which consisted of a series of questions aimed at providing the relevant information. The data for each country and the combined report was checked for accuracy and completeness. Except for two minor adjustments, the data was deemed accurate and comprehensive. The independent Emeritus Professor was also requested to review the four data reports and no errors were detected. The researcher established that the data was consistent with research questions and objectives.

As mentioned, the objective of the study was to produce a joint report for VET green entrepreneurial skills for SME development among the implementing partners identifying the essential skills in the three countries under study which will support innovation, design-thinking, and greening in SMEs. The questionnaire also contained a section on demographic data for the participating organisations and survey data related to essential green skills for SME development in a green economy. Several key items were covered including entrepreneurial skills for a green economy, barriers to developing green skills, the role of SMEs and TVETS in development of the green economy, enablers, and focus areas of a green economy. The structured data collection instrument thus enabled the researcher to summarise, analyse and compare the data of each country.

Online questionnaires are advantageous for this type of research project where respondents are located across different geographies and because it is a quick and inexpensive method of collecting data. The respondents of the study remained anonymous and could complete the questionnaire at their convenience. All respondents were emailed the same questionnaire and the standardised wording of the questionnaire ensured consistency, provided more accurate and honest responses and precluded interviewer bias.

The data and information collected from the desk and field research was included in the regional reports of each country. SADRAT prepared the guidelines related to the report preparation (its structure, length, and format) and presented it to the partners for approval.

This study was conducted within the ethical guidelines of the countries, particularly the ethical obligations spelt out in the relevant policy document for ethics in research. Informed consent was handled as an ongoing process of establishing and sustaining a trusting and empowering relationship between the researcher and the research participants.[153] The term validity (that is, construct validity, content validity, measuring validity and face validity) denotes the questionnaires' ability to measure that it is

[153] Tauri, J. M. 2018. *Research ethics, informed consent and the disempowerment of First Nation peoples*. Research Ethics. 2018. Vol.14(3):pp.1-14. doi:10.1177/1747016117739935

expected to measure.[154] For internal validity, data was collected according to a justifiable research plan from which valid data interpretations were made.

The small number of questionnaires required for the purposes of the project affected the representivity. The findings cannot be generalised and no significant inferences can be made which limit the study's conclusions. However, the statements made in this study are applicable to the portion of the population that was sampled in the study and can serve as a useful basis for further study. To be able to apply the findings, a larger sample is needed, and this is one of the recommendations.

Chapter 5 Results

The research study was primarily focused on green entrepreneurial skills for SMEs with specific emphasis on the problem of skills demand for a green economy in SSA countries. The analysis was limited to TVET institutions and the SME sector in these countries. The research problem comprised two primary research questions, namely:

(i) What are the essential green skills for SMEs?

(ii) What entrepreneurial green skills are required by SMEs?

The study included three secondary research questions:

(iii) Which factors have an impact on a green economy?

(iv) What are the barriers to the development of green skills?

(v) What is the level of responsiveness and readiness of TVETs in green skills development for SMEs?

By investigating the skills demanded in SSA for a greener society, this study established that 21st century skills are very important for SME development in a greener society. In addition, the study established that several knowledge areas of the green economy are crucial for skills development. Furthermore, a consensus definition of entrepreneurial green skills was formed. Mapping the skills demand revealed several skills needs, skills gaps and to some extent skills mismatch. Thus,

[154] Wallace, M. & Sheldon, N. 2015. Business Research Ethics: Participant Observer Perspectives. J Bus Ethics 128, pp. 267–277. https://doi.org/10.1007/s10551-014-2102-2 185.

the study ascertained skills shortages for the growing SMEs. However, the proliferation of these skills among SMEs in SSA countries varies considerably and the study revealed a drastic need for skills development to reinforce a greener and more inclusive society. The findings reported here represent the combined results for the three participating countries. This chapter first outlines general information which is followed by the findings in respect of the research questions.

The first section profiles the general information of respondents and their respective organisations. As already outlined, data was collected using a questionnaire from three countries. Sixty-four (64) organisations completed the questionnaire in three countries as follows: South Africa (21), Kenya (10) and Nigeria (33). Of these organisations, the majority (50.0%) were private organisations, followed by public organisations (37.5%). The results indicate that the core business of most of the organisations is education, training, and development (31.7%) while others included: Information and Communication Technology Industry, Information Technology & Information Technology Consultancy (6.7%), assisting small and informal businesses with information for growth and legislation (5.0%), resale of cleaning chemicals, sales and services of phones and laptops (5.0%). The size and shape of the participating organisations were also analysed with reference to employees, turnover and enrolments.

The results indicate that most of the organisations (37%) have 1-20 employees (57.8%) and 20 organisations have more than 80 employees (31.3%), and five (5) have 21-40 employees (7.8%). Most of the organisations (21) in the sample have an annual turnover of more than 20m (32.8%), followed by 18 organisations with 1m-5m (25.0%) and 14 organisations with up to 1m (21.9%). Of the 64 organisations that participated in the survey, only 34 (53.1%) enrolled students in their institutions. The results indicate that most institutions (16) enrolled up to 200 students (53.1%) and 12 institutions enrolled more than 1,000 students (35.3%). All the respondents held senior designations at the participating organisations ranging from CEO and Managing Director to Manager and Head of Department. In addition, most of the respondents (22) had a Bachelor's degree (34.4%), 15 had a Master's degree (23.4%) and 12 respondents an Honours degree (18.8%) which implies that most of the respondents were well educated.

5.1 Essential green skills for SMEs

Preparing people for current and future needs requires an understanding of the skills needed for the 21st century. These skills are more relevant to the current economic, social, and ecological developments than to an industrial production complex. The

respondents were asked to respond to a series of questions related to the essential green skills for SMEs. The categories of questions were:

- 21 century skills, core and contextual
- the knowledge areas that are important in green economy
- a definition of green skills
- the general green skills index
- components of green skills
- a self-assessment of green skills competence
- the priority skills for SMEs in an emerging green economy

5.1.1 21st Century skills

Respondents were asked to rate each skill in terms of importance for a green economy. Figures 2a and 2b below list the 21st Century Skills-Core skills and Contextual skills respectively selected from extensive literature in terms of importance for a green economy. Overwhelmingly, the results indicate that the respondents rated all the Core skills as important, ranging from 55 out of 62 respondents (54.8%+27.4%+6.5%=88.7%) for Creativity to 60 (54.7%+31.3%+7.8%=93.8%) respondents for Collaboration. Skills which were rated as very important are: Problem solving (58.7%) and Communication (56.5%). The results also indicate that the respondents rated all the Contextual skills as important, ranging from 55 (39.1%+39.1%+7.8%=86.0%) respondents for Cultural Awareness to 58 (45.3%+32.8%+12.5%=90.6%) respondents for Lifelong learning.

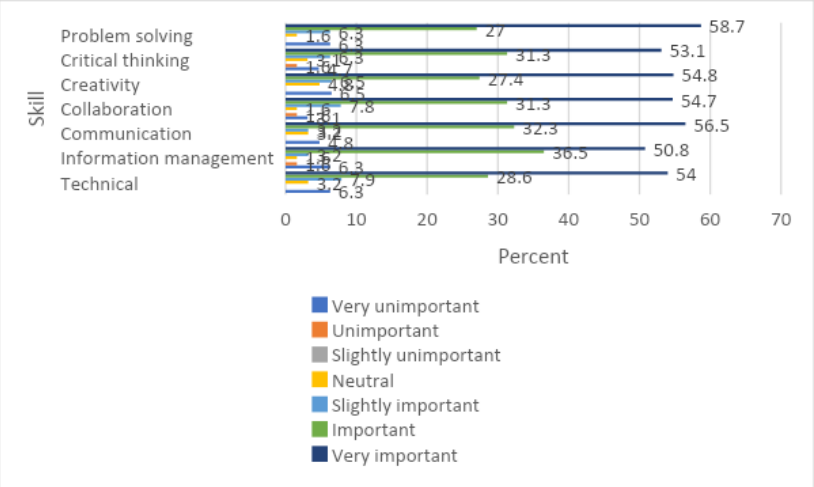

Figure 2a: 21st Century skills like problem solving, creativity, critical thinking, collaboration and communication are key building blocks of design thinking and innovation.

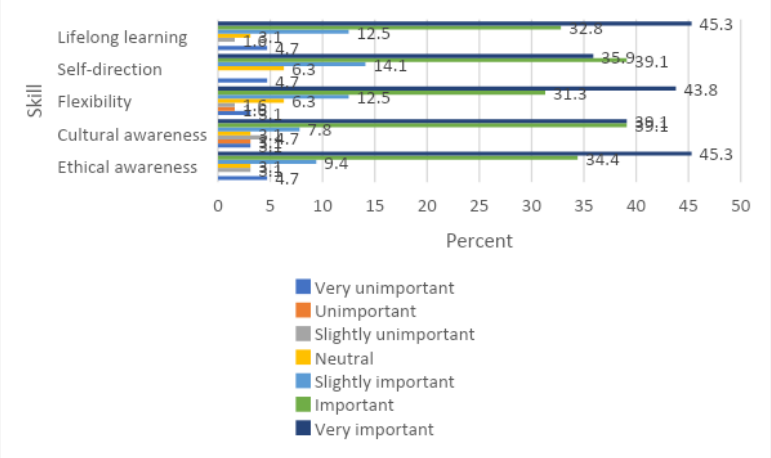

Figure 2b:21st Century Contextual skills

5.1.2 Knowledge areas in a green economy

The importance of each of the knowledge areas was rated, on the 7-point Likert scale, ranging from very unimportant to very important. In general, the respondents rated all the knowledge areas (environmental accountability, waste management, conservation, recycling, and renewable energy) as important, ranging from 54 (62.5%+17.2%+4.7%=84.4%) respondents for Renewable energy to 56 (56.3%+25.0%+6.3%=87.6%) respondents (for Waste management).

5.1.3 Definition of green skills

The respondents were asked whether they agreed or disagreed with the definition of green skills on the 7-point Likert scale, ranging from strongly agree to strongly disagree. These skills were defined as “the knowledge, abilities, values, and attitudes needed to live in, develop and support a sustainable and resource-efficient society.” The results indicate that almost all the respondents (57) (45.3%+39.1%+4.7%=89.1%) agreed with the definition.

5.1.4 General green skills index

Respondents had to rate the importance of four groups of work tasks for green occupations as identified by the Green General Skill index. The rating on the 7-point Likert scale, ranged from very unimportant to very important. The results (see Figure 3 below) indicate that the respondents rated all the groups of work tasks as important, mostly from important to very important with an overall importance ranging from 57 (46.9%+34.4%+7.8%=89.1%) respondents for Monitoring skills to 59 (46.9%+32.8%+12.5%=92.2%) respondents for Operations management skills.

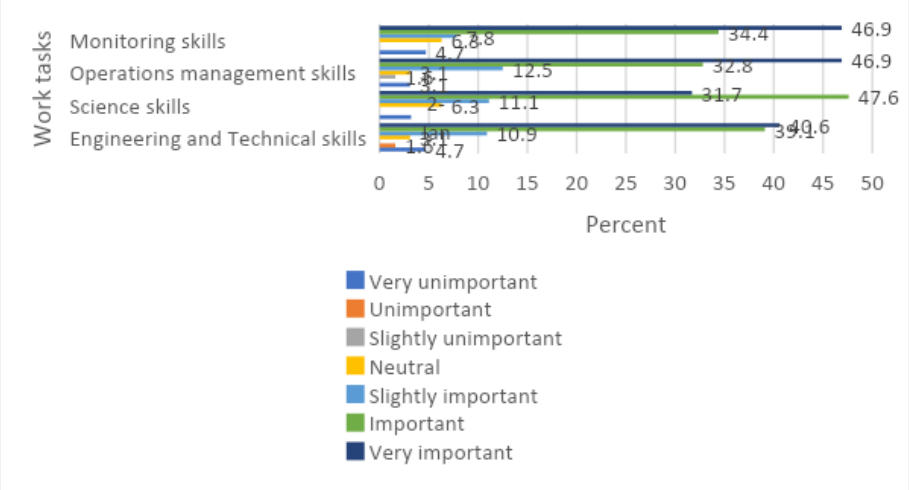

Figure 3:General green skills index

In addition, Figure 4 below shows the percentage distribution for the rating of the importance of six (6) green key skills for a green economy. The rating on the 7-point Likert scale ranged from very unimportant to very important. The results indicate that overwhelmingly, the respondents rated all the green key skills as important, ranging from 56 (28.6%+49.2%+11.1%=88.9%) for science skills to 61 (42.9%+36.5%+17.5%=95.9%) for Agricultural skills. The results imply that the listed green key skills are important.

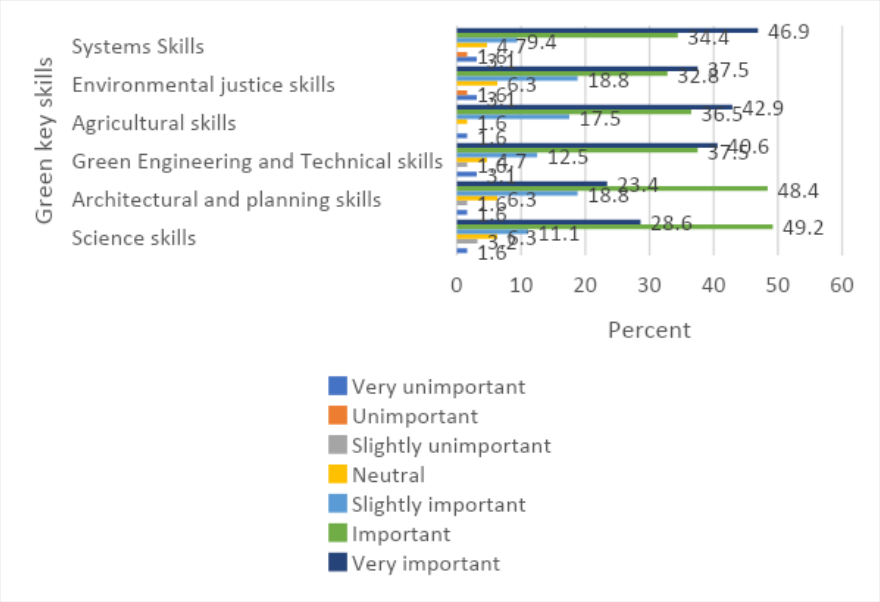

Figure 4: Importance of green skills for a green economy

5.1.5 Components of green skills

In general, the respondents rated as important two components of green skills development (High level analytical skills and High-level technical skills) with 58 (9.4%+25.0%+56.3%=90.7%) and 57 (6.3%+21.9%+60.9%=89.1%) respondents respectively. This result implies that respondents consider these two components as important for green skills development.

5.1.6 Self-assessment of knowledge and expertise

To determine whether the respondents on average rated a particular green skill as 'poor' or 'good' for a particular skill, percentages of 'very poor', 'poor', and 'slightly poor' were added together to obtain a composite percentage for 'poor', and likewise added those of 'very good', 'good', and 'slightly good' together to obtain a composite percentage for 'good' and compare them. Thus, the number of respondents who rated a green skill as 'good' ranged from 33 (12.5%+14.1%+25.0%=51.6%) for Engineering skills for the design and production of technology to 46 (17.2%+32.8%+21.9%=71.9%) for the importance of green skills for sustainable future, and waste management.

5.1.7 Knowledge of priority skills for SMEs in an emerging green economy

Figure 5 below shows the percentage distribution of the respondents' ratings of priority skills in demand for the future economy, based on a 2022 Report by SkillsFuture Singapore.[155] A 7-point Likert scale ranging from 'very poor' to 'very good' was used. The results indicate that mostly, the respondents rated the skills between slightly good to very good.

The number of respondents for the rating of 'good' ranged from 42 (7.8%+29.7%+28.1%= 65.6%) for 'Perform energy audits to optimise energy management and consumption; Analyse the impact of renewable energy system integration; and Develop an organisation-wide sustainability strategy inclusive of assessment of the organisation's consumption of energy and other resources' to 49 (17.2%+26.6%+32.8%=76.6%) for 'Manage efficient use of energy and other resources to promote sustainable manufacturing operations; and Understand the latest standards regarding Environment and Social Governance (ESG) and undertake ESG research activities'.

[155] Retrieved from: https://www.myskillsfuture.gov.sg/content/portal/en/career-resources/career-resources/education-career-personal-development/Skills_Demand_for_the_Future_Economy_Report_2022.html

The results imply that the respondents regard all the listed priority skills in demand for the future economy as good.

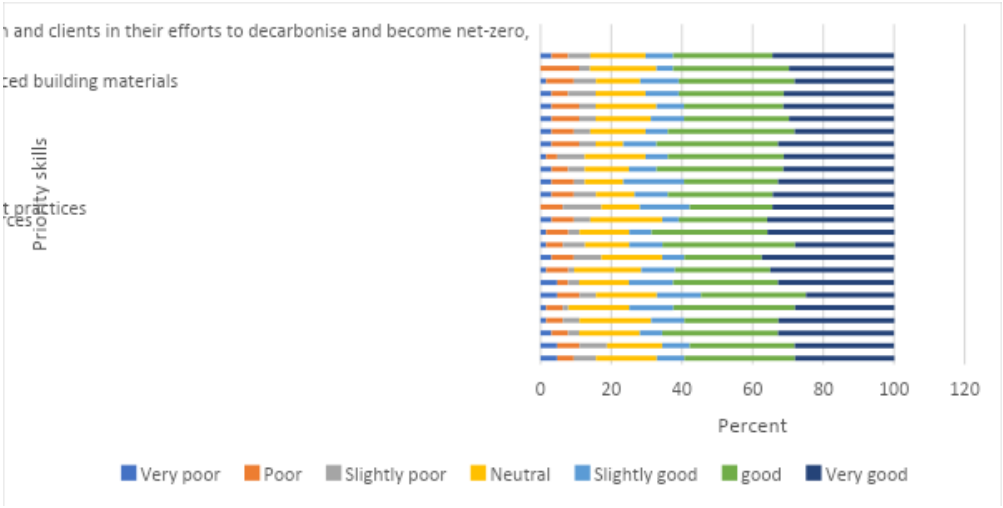

Figure 5:Knowledge of priority skills for SMEs in an emerging green economy

5.2 Entrepreneurial green skills for SMEs

The promotion of entrepreneurial green skills among SMEs is a significant step towards green innovation and SME development. Such promotion is pivotal for sustainable development. To map entrepreneurial green skills for SMEs, the respondents were asked to respond to a series of questions to rate the importance of entrepreneurial skills for a green economy, listing the three most relevant skills and identifying the top 10 skills in demand in business as well as the importance of the 10 top skills for the year 2025 for a green economy. The importance of each of the entrepreneurial skills was rated, on a 7-point Likert scale, ranging from 'very unimportant' to 'very important'. Overwhelmingly, the respondents rated all the skills as important entrepreneurial skills for a green economy, mostly from important to very important, ranging from 56 (50.0%+34.4%+3.1%=87.5%) for Communication, for example to 60 (46.9%+31.3%+15.6%=93.8%) for Collaboration.

Similarly, respondents had to rate the importance of the 10 top skills for the year 2025 listed by WEF as part of a Future of Jobs Report. Their importance for the SMEs in the green economy was rated, on a 7–point Likert scale, ranging from 'very unimportant' to 'very important'. Figure 6 shows the results which indicate that the respondents rated all the skills as important, ranging from 55 (54.7%+21.9%+9.4%=86.0%) for Complex problem solving to 60 (42,2%+43.8%+7.8%=93.8%) for Resilience, stress tolerance and flexibility.

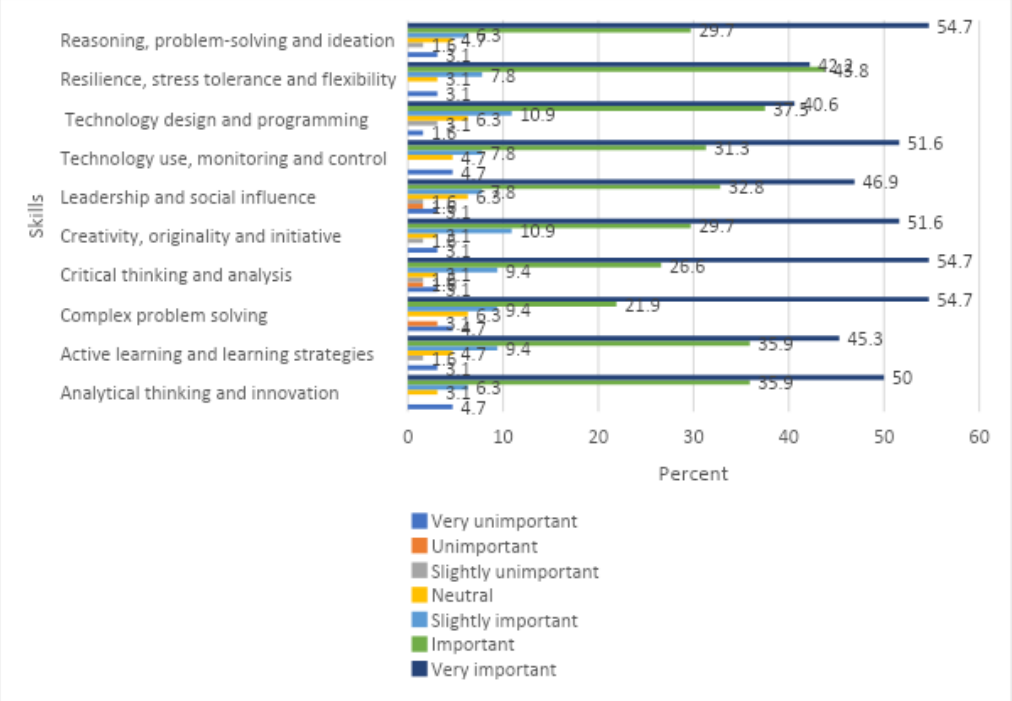

Figure 6: Importance of the ten top skills for the year 2025

In addition, the respondents were asked to write down one skill from the list of skills mentioned above which they consider the most relevant, together with a motivation. The results are captured in rank order in Table 1 below:

Serial No./Rank order	One skill most relevant	Number of times mentioned
1	**Analytical thinking and Innovation:** to find 'out of the box' options to be cost-effective green creativity, originality, and initiative. Analytical thinking helps to answer the question 'why', hence helping one to identify the core problem that needs to be solved. Innovation helps in coming up with modified products or processes that have advantage over those in existence hence creating a market niche, and thus sustainability of the business. Analytical thinking and innovation because we need to come up with new ideas and technologies of doing things.	10
2	**Creativity, originality, and initiative**. This skill will be most relevant to navigate the ever-changing landscape of not just the green economy, but every economy as there will be a lot of interconnectivities of economies.	8
3	**Leadership and social influence**. Everything rises and falls on Leadership. A green-economy-conscious leader will be interested in pushing policies and legislation to foster sustainable lifestyles. You need	7

	to bring all onboard, otherwise there will be no ownership, and this can affect sustainability	
4	**Reasoning, Problem solving and ideation**. The whole world is in dire need of [those] who can solve problems in critical areas .	6
5	**Resilience, stress tolerance and flexibility**	4
6	**Technology design and programming**	4
7	**Critical thinking and Analysis** The skill is crucial to scan the business environment for untapped business opportunities.	2
8	**Active learning and learning strategy**	2
9	**To adapt:** The world is changing at a rapid pace, and we need to be able to adapt our businesses accordingly	1
10	**Science**	1

Table 1: One skill most relevant

Evidently, analytical thinking and innovation (10), Creativity, originality, and initiative (8), and leadership and social influence (7) are considered by the respondents as most relevant. As mentioned in Chapter 2, these three skills clusters are fundamental in sustainability education and are indispensable for SME development in a greener society.

Several factors play a role in the green economy and respondents were asked a series of questions to establish their perceptions of their country's approach to environmental skills planning and provision for the green economy in terms of being 'Ad hoc', 'Reactive', 'Inadequate' or 'Systematic'. Most respondents described their country's approach as 'Inadequate' (5.0%+21.7%+61.7%=88.4%).

Several entities play an important role in developing an appropriately skilled workforce. The listed entities were rated on a 7-point Likert scale, ranging from 'very unimportant' to 'very important'. The results (Figure 7) indicate that, overwhelmingly, the respondents rated all the entities as important, ranging from 22 (15.4%+34.6%+34.6%=84.6%) for other entities to 59 (4.8%+30.6%+59.7%=95.1%) for SMEs showing that all the listed entities were regarded as playing an important role in developing an appropriately skilled workforce.

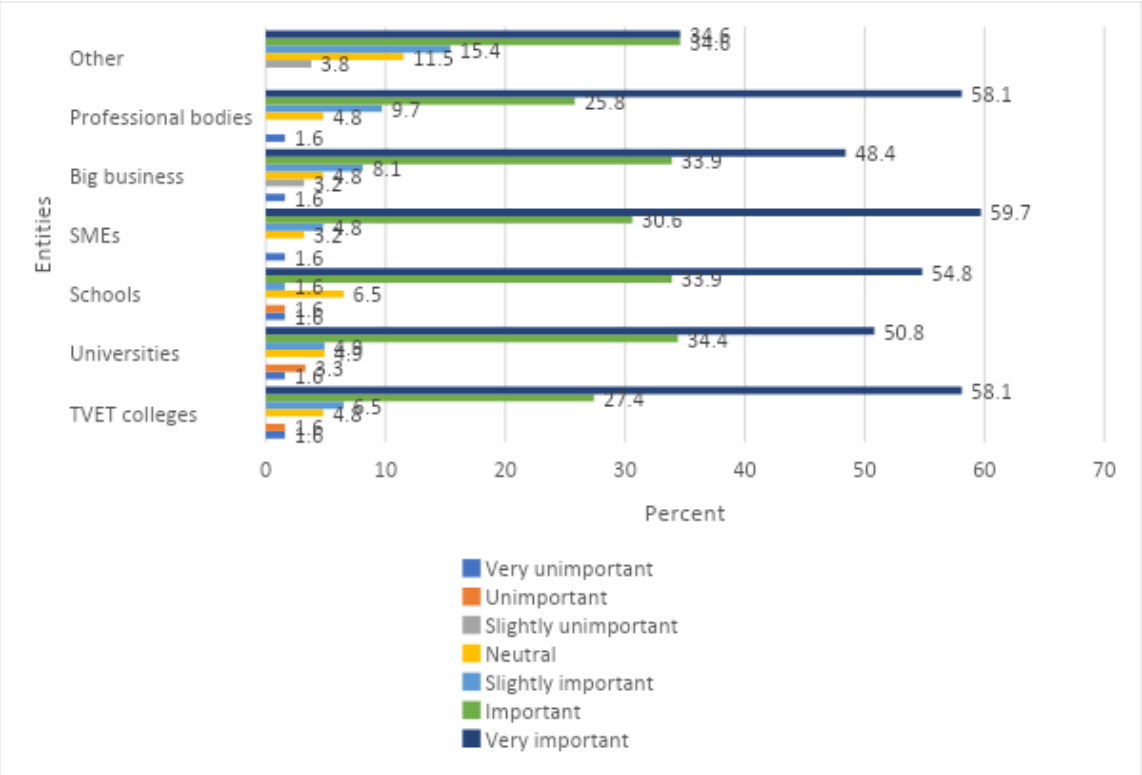

Figure 7: Importance of entities in developing appropriately skilled workforce

According to the literature, green economy programmes consist of nine focus areas which have implications for green jobs supply and demand. Respondents were asked to rate the importance of each focus area on a 7-point Likert scale, from 'very unimportant' to 'very important'. The results (see Figure 8 below) indicate that, overwhelmingly, the respondents rated all the key focus areas as important, ranging from 56 (7.8%+29.7%+50.0%=87.5%) for Sustainable consumption and production) to 60 (4.7%+32.8%+56.3%=93.8%) for Sustainable waste management practices and Agriculture, food production and forestry). In general, the respondents rated the nine key focus areas as important for the development of green jobs.

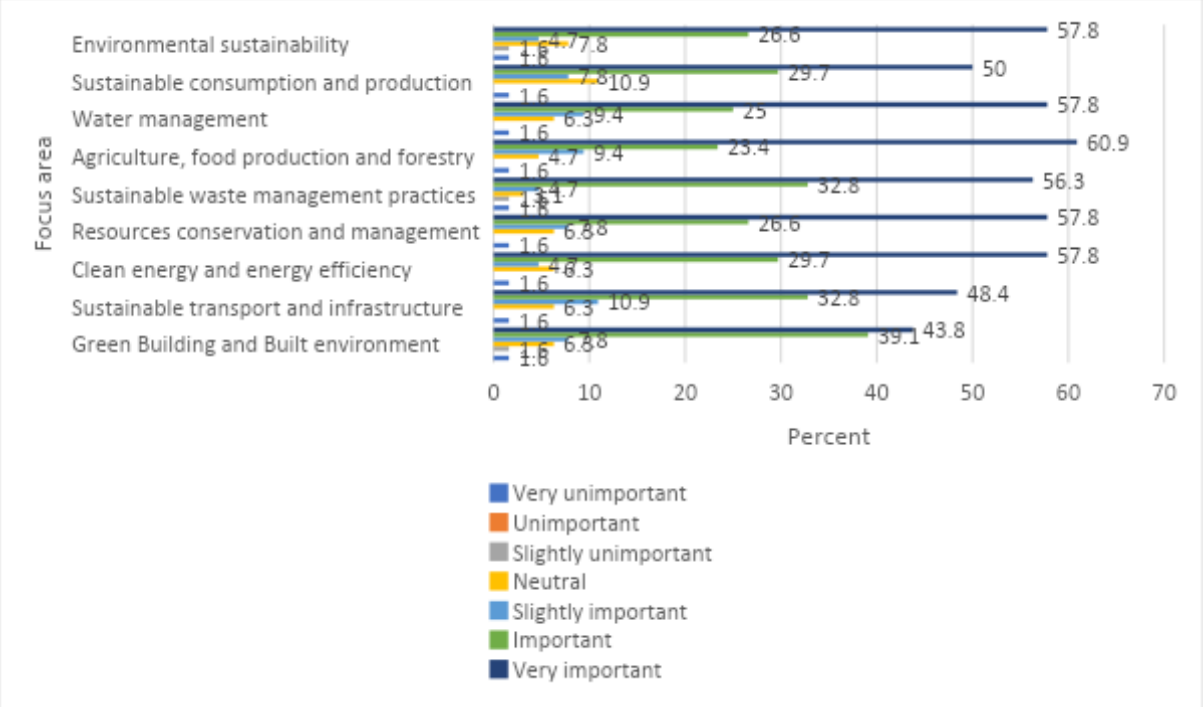

Figure 8: Focus areas

The respondents were presented with a list of enablers for the implementation of the green economy and asked to rate their response. The rating on a 7-point Likert scale, ranged from 'strongly disagree' to 'strongly agree'. The results indicate that, overwhelmingly, the respondents agreed with all the enablers, ranging from 56 (15.6%+29.7%+42.2%=87.5%) for Commercialization to 62 (9.4%+32.8%+54.7%=96.9%) for Innovation, Science and Technology. The results (see Figure 9 below) imply that all the listed nine enablers for the implementation of the green economy are important.

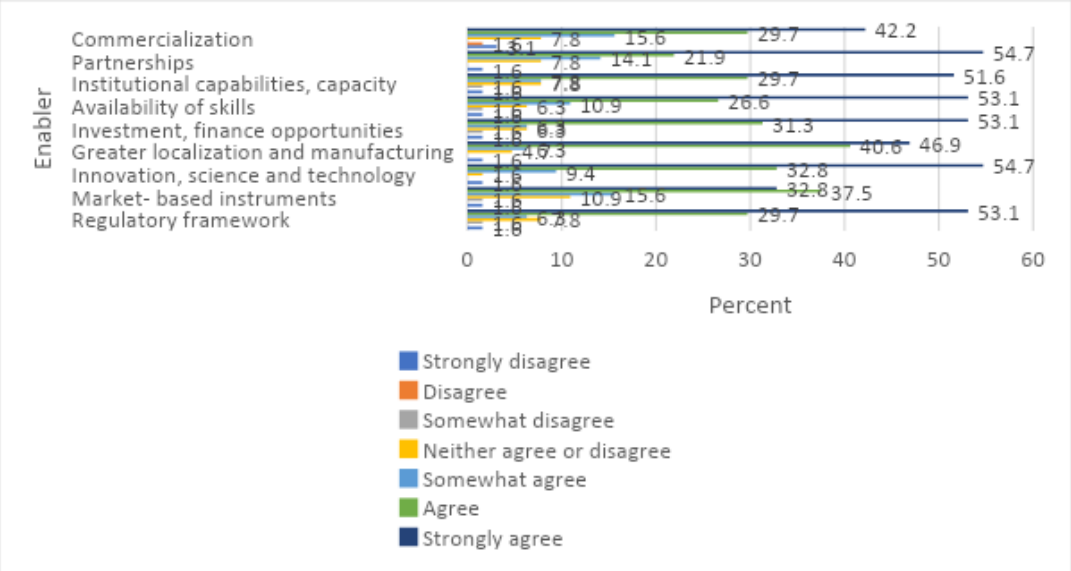

Figure 9: List of enablers for the implementation of the green economy

As already mentioned, SMEs are widely acknowledged for the role they play in the economy and respondents rated the importance of the contribution that SMEs can make to the development of the green economy on a 7–point Likert scale which ranged from 'very unimportant' to 'very important'. Of the 64 respondents who were in the sample, only three (3) (4.7%) respondents rated SMEs role as unimportant, whilst 58 rated it as important (4.7%+15.6%+70.3%=90.6%). The results imply that the role that SMEs can play in the development of the green economy is important. Some of the reasons given by respondents were:

All sectors of the future will be dominated by SMEs who are directly involved in the implementation. They are the majority and therefore have a bigger influence. SMEs have a role to play in the development of the green economy because their understanding and adoption of green values and knowledge into their daily operations will help solidify the emergence of and transition to a greener economy. The small changes can be cumulative and decrease ecological footprint as an organisation thus contributing the environmental sustainability. SMEs can easily adapt to the green economy. SMEs can set the tone, pace, and champion green economy through forums, adopting best practices. Their position in the economic ladder means they have access to the largest pool of people who can be influenced to take the green economy to the next level. They are closer to most of the citizens. SME is a positive contribution in the development of the green economy.

These results indicate that the most frequent, and hence the seemingly the most important reasons given, were that SMEs help to develop a green economy (13), followed by SMEs contribution to job creation and poverty alleviation (9) and skills development (6).

Regarding identifying the barriers to the development of green skills, Figure 10 (see below) depicts the extent to which the respondents agreed with the statements concerning the barriers to the development of green skills. A 7-point Likert scale was used, ranging from 'strongly disagree' to 'strongly agree'. The results indicate that, overwhelmingly, the respondents agreed with all the listed barriers to the development of green skills, ranging from 52 (31.3%+35.9%+14.1%=81.3%) for Poorly trained educators to 61 (34.4%+45.3%+15.6%=95.3%) for Lack of planned reskilling for green jobs.

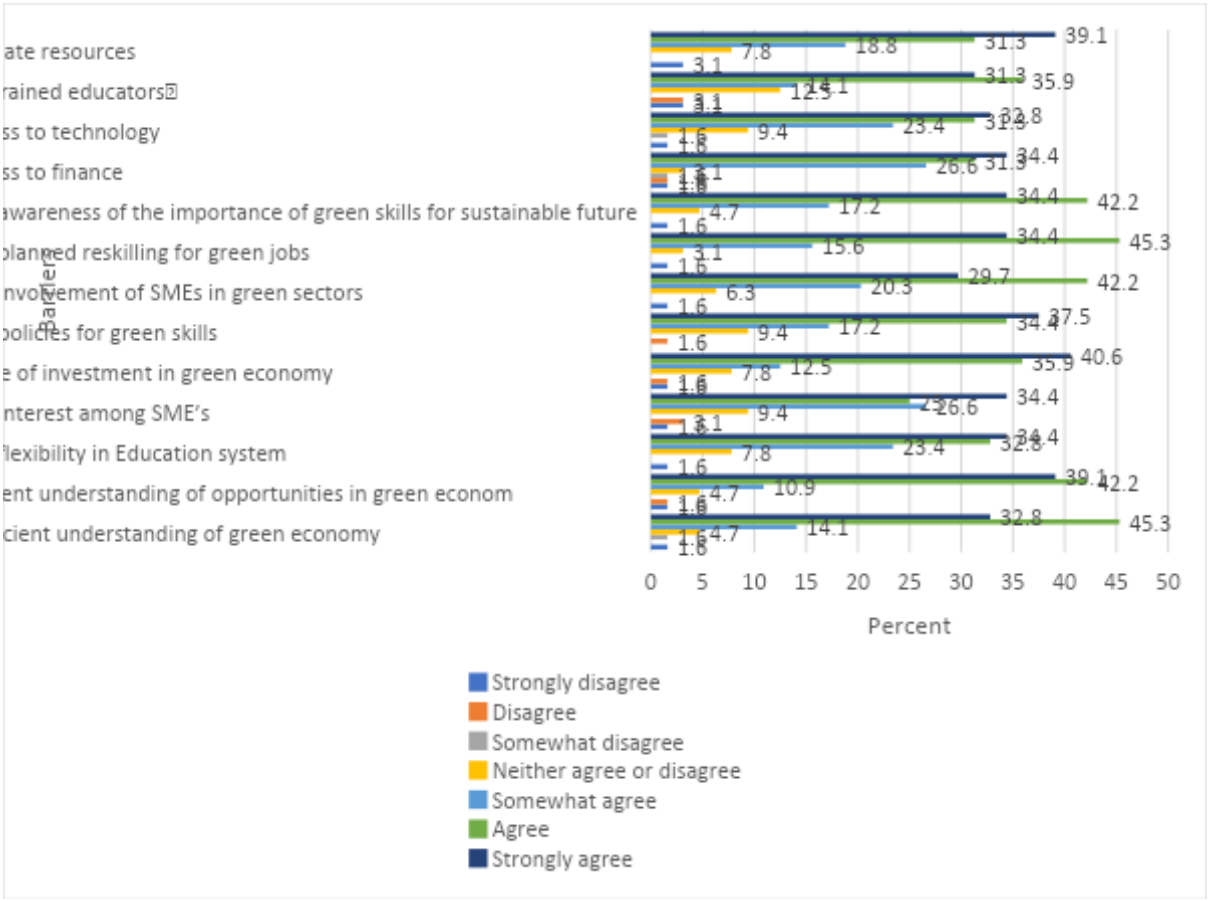

Figure 10: Barriers to the development of green skills

Rating the Quality of Vocational and Educational Training (VET) for green skills development among SMEs in South Africa, Kenya and Nigeria was also scored on a 7–point Likert scale which ranged from 'very poor' to 'very good'. Overall, 25 (10.9%+27.3%+7.3%=45.5%) respondents rated the quality of VET as 'poor' against 16 (12.7%+14.5%+1.8%=29.0%) respondents who rated it as 'good'. Seemingly, in general, the quality of VET for green skills among SMEs in these countries is not regarded as good and, interestingly, 25% of respondents were neutral in their perceptions.

The level of awareness of a green economy among the general population is another important factor and respondents rated the level of awareness of green skills in their country, again on a 7-point Likert scale which ranged from 'very unaware' to 'very aware'. Sixty-three (63) respondents did the rating and of these twenty-five (25) (12.7%+19.0%+7.9%=39.6%) rated the level of awareness as 'Unaware' and 26 (27.0%+11,1%+3.2%=41.3%) rated it as 'Aware'. Seemingly, in general, the respondents regard their country as neither unaware nor aware of the green skills. This implies that the level of awareness of green skills among education and training

practitioners in the three countries is not clear. This conclusion was supported by the t test (t=-1.170, prob.=.123>.1).

A good level of responsiveness and readiness of the TVET sector is crucial for green skills development. Indicators of quality, appropriateness of teaching and the curriculum as well as the standards are vital to assess if TVETs are fit for purpose. Respondents were asked to rate the quality of the development of green skills and capacities for SMEs. The rating on a 7-point Likert scale ranged from 'very poor' to 'very good'. Ratings of the quality of the development of green skills and capacities for SMEs were based on the 7–point Likert scale which also ranged from 'very poor' to 'very good'. Many of the respondents were neutral (17, 27.0%); 27 respondents gave a rating of 'poor' (9.5%+22.2%+11.1%=42.8%) against 19 respondents who gave a rating of 'good' (14.3%+11.1%+4.8%=30.2%). The t test results (t=-1.579, prob.=,119>.1) indicated that the respondents rated the quality of the development of green skills and capacities for SMEs as neither 'poor' nor 'good' which implies that the quality of the development of green skills and capacities for SMEs is not known.

Ratings of the development and teaching of green skills through Vocational and Educational Training (VET) on the 7–point Likert scale showed that of the 64 respondents who were in the total sample, the majority (47) rated the VET development as 'appropriate' (6.3%+29.7%+37.5%=73.5%), against six (6), who rated it as 'inappropriate' (4.7%+1.6%+3.1%=9.4%). The results indicate that, in general, the respondents regard the development and teaching of green skills through VET as appropriate.

Ratings of the extent of the respondents' agreement with the statement that 'Vocational and Educational Training (VET) is fit for the purpose and meet the standards expected of them' on the 7–point Likert scale ranged from 'strongly disagree' to 'strongly agree'. Of the 64 respondents who were in the total sample, the majority (42) agreed (19.4%+27.4%+21.0%=67.8%) with the statement against 10 who disagreed (3.2%+4.8%+8.1%=16.1%). Therefore, the results indicate that, in general, the statement that "Vocational and Educational Training (VET) is fit for the purpose and meet the standards expected of them" was agreed upon by the respondents.

The extent to which the respondents are satisfied with the Curriculum of TVET colleges was rated on the 7–point Likert scale ranging from 'very dissatisfied' to 'very satisfied'. The results indicate that 14 respondents were dissatisfied (5.2%+13.8%+5.2%=24.2%) with the curriculum and 26 were satisfied (10.3%+32.8%+1.7%=44.8%). The student's t test results (t=1.555, prob.=.126>.1) showed that there was no statistically significant difference between the scores of those who were dissatisfied with the curriculum and of those who were satisfied with

it. Hence, the results imply that, on average, the respondents were undecided about whether the curriculum is satisfactory or not

5.3 Summaries of the main findings for the three SSA countries

5.3.1 South Africa

Twenty-one (21) organisations participated in this survey and most of these were public organisations with a core business of mainly education and training, construction, computer, and technology industries. Most of the sampled organisations had 1-20 employees and more than 80: mostly with an annual turnover of up to R1m– 5m and more than R20m. Most of the respondents were managing directors, acting centre managers (two centre managers), curriculum managers and had either an honours degree, a bachelor's degree, or a master's degree, mostly in the fields of management, engineering or education.

In summary, the main findings were:

- All the VET Green Entrepreneurial Skills for SME Development identified from the literature (for example, problem solving, information management, collaboration, and communication) are important.
- All knowledge areas (for example, environmental accountability, waste management, conservation, recycling, and renewable energy) are important.
- Entrepreneurial skills for a green economy are important.
- The skills considered by the respondents to be most relevant for participation in the green economy are Collaboration, Business strategy, Design thinking, networking, and Communication.
- All the listed groups of work tasks for green occupations are important.
- All the Top skills for the year 2025 as part of a Future of Jobs Report skills are important.
- Leadership in respect of change management and social influence; analytical thinking and innovation as well as Reasoning, problem-solving and ideation were most relevant for green economy, and skills development.
- All the listed barriers to the development of green skills are important, according to the respondents.

- Seemingly, in general, the quality of VET for green skills among SMEs in South Africa is not good.
- The level of awareness of green skills among education and training practitioners in South Africa is good.
- The role that SMEs can play in the development of the green economy is important, reasons being Job creation and poverty alleviation, development of the green economy, and skills development.
- Seemingly, the quality of the development of green skills and capacities for SMEs is poor.
- The development and teaching of green skills through VET are appropriate.
- Vocational and Educational Training (VET) is fit for the purpose and meets the standards expected of them.
- All listed green key skills are important.
- The entities such as SMEs, professional bodies, TVET colleges have played an important role in developing an appropriately skilled workforce.
- The key focus areas of green economy programmes for the development of green jobs are important.
- All the listed enablers for the implementation of the green economy are essential.
- The respondents were undecided as to whether the curriculum of the TVET colleges is satisfactory.
- The two components for green skills development, namely, high level analytical skills and high-level technical skills are important.
- The priority skills for SMEs in an emerging green economy such as managing efficient use of energy and other resources to promote sustainable manufacturing operations; integrating environmental sustainability programmes that reduce waste, conserve energy, and use replacements for hazardous substance; and understanding the latest standards regarding Environment and Social Governance (ESG) and undertaking ESG research activities are critically important.
- The country's approach to environmental skills planning and provision for the green economy is inadequate.

5.3.2 Kenya

Data was collected from ten respondents in this survey in Kenya. Most respondents were in a public organisation employing more than 80 permanent employees in the field of Agriculture, Fishing and Forestries. Most organisations in the sample had an annual turnover of more than R20m. Four were engaged in educating students and three enrolled more than 1,000 students in their institutions. Two of the respondents were senior lecturers or researchers, one was a Business Development Officer, and one a Chairman. Their highest academic qualifications were mostly Bachelor's degrees. Two of the ten respondents had a Doctorate. This implies that these respondents were well educated. Most of the respondents had studied in the field of agriculture.

In summary, the main findings for the Kenyan respondents were:

- The respondents rated all the listed core skills and contextual skills as important.
- The majority rated all the knowledge areas (environmental accountability, waste management, conservation, recycling, and renewable energy) as important.
- Almost all the respondents agreed with the definition of green skills.
- The respondents rated all the groups of work tasks as important.
- All the listed green key skills were rated as important.
- The two components of green skills development were regarded as important.
- The respondents rated all the listed priority skills for SMEs in an emerging green economy as good.
- Except for 'Engineering skills for the design and production of technology', the respondents indicated that their level of knowledge of most of the green skills is good.
- The respondents rated all the listed entrepreneurial skills for a green economy as important.
- They regarded leadership and social influence, and analytical thinking and innovation as the most relevant skills.
- Most respondents described their country's approach to environmental skills planning and provision for the green economy as 'inadequate'.
- According to the respondents all the listed entities play an important role in developing an appropriately skilled workforce.

- All the listed nine key focus areas of green economy programmes are important for the development of green jobs in Kenya.
- All the listed enablers for the green economy were found important.
- The results also showed that the role that SMEs can play in the development of the green economy is very important.
- All the listed barriers to the development of green skills were seen as important.
- The quality of VET for green skills development is somehow fit for the purpose and meets the standards expected of them.
- The level of awareness of green skills among education and training practitioners in Kenya is mostly good.
- The quality of the development of green skills and capacities for SMEs in the country is also somehow good.
- In general, the respondents rated the development and teaching of green skills through VET as appropriate, but they find that the curriculum is not satisfactory.

5.3.3 Nigeria

Of the organisations that participated in the survey in Nigeria, the majority were private organisations. The core business of these organisations was education, training and development, Information Technology & IT Consulting, and Business Development Consulting and Consulting. Most of the organisations were from the sectors of Education and Training, Research, Computer and Technology, Hospitality, and Travel & Transportation. Most organisations had 1-20 employees with an annual turnover of R1m-R5m and a few? had more than 20m. Eleven institutions enrolled up to 200 students, two institutions enrolled 201-400 students and one organisation enrolled more than 1,000 students. The sample included eight Chief executive officers, creative designers or CEOs, five founders, and three Managing Directors or Directors. Most of the respondents in the sample had a Bachelor's degree, ten respondents had a Master's degree and six had an Honour's degree. Most of the respondents (13) had studied management, six had studied science, and four had a qualification in engineering (12.1%).

In summary, the main findings for the Nigerian respondents were:

- All the core skills and contextual skills were rated as important.
- The listed knowledge skills were rated as important.
- All the respondents agreed with the definition of green skills.

- The respondents rated all the groups of work tasks as important.
- The listed green key skills were rated as important.
- The two components of green skills development were rated as important.
- All listed green key skills were rated as important.
- The respondents rated their knowledge of their green skills as ‘good’.
- All the listed priority skills in demand for the future economy were rated as good.
- The respondents rated all the entrepreneurial skills as important skills for a green economy.
- Communication, Collaboration, and Ability to learn were the skills considered the most relevant for participation in the green economy.
- The respondents rated all the top skills for the year 2025 as part of a Future of Jobs Report skills as important.
- Complex problem solving and ideation, Analytical thinking and innovation, Leadership and Creativity, Originality and initiative were considered the most relevant skills for a green economy.
- Most respondents described Nigeria’s approach to environmental skills planning and provision for the green economy as ‘inadequate’.
- Most respondents agreed that the listed entities, such as big business, SMEs, schools and TVETs play an important role in developing an appropriately skilled workforce.
- Respondents agreed that all the listed nine key focus areas of green economy programmes for the development of green jobs are important.
- All the listed nine enablers such as the regulatory framework, market-based instruments, and innovation, science, and technology for the implementation of the green economy were regarded by the respondents as important.
- The role that SMEs can play in the development of the green economy is important.
- The most frequent reasons given for the importance of this role were: green economy is grassroots economy, and SMEs can contribute.
- The respondents agreed with all the listed statements of barriers to the development of green skills, such as shortage of investment in green economy,

insufficient understanding of green economy, and lack of planned reskilling for green jobs.

- Seemingly, in general, the quality of VET for green skills among SMEs in Nigeria is not good.
- The level of awareness of green skills among education and training practitioners in Nigeria is not known.
- Seemingly, the quality of the development of green skills and capacities for Nigerian SMEs is poor.
- The respondents rated the development and teaching of green skills through VET as appropriate.
- In general, the statement that 'Vocational and Educational Training (VET) is fit for the purpose and meet the standards expected of them' was agreed upon by the respondents.
- Seemingly, in general, the respondents were satisfied with the VET curriculum.

Chapter 6 Discussion

The findings of this study clearly show that all the listed 21st Century Skills-Core skills and Contextual- skills are essential green skills for SMEs. Several knowledge areas as well as group work tasks and technical and analytical components of green skills development were identified as important for SMEs. Furthermore, the findings confirmed a consensus definition of entrepreneurial green skills as the knowledge, abilities, values, and attitudes needed to live in, develop and support a sustainable and resource-efficient society. This definition includes the technical skills, knowledge, values, and attitudes needed in the workforce to develop and support sustainable social, economic, and environmental outcomes in business, industry, and the community. These attributes are closely related to the 21st Century core skills and deemed crucial for a green economy.

Several studies indicate the need for green skills in a green economy, emphasizing that challenges in developing and implementing these skills remain. Some of these challenges are a lack of policy clarity and investment in renewables and green skills training. The competencies identified for sustainability in various sectors like

agriculture and energy were technical, relational, and transformational competencies. Ten common green skills demanded by various industrial sectors include design, leadership, and energy skills.[156] Skill training institutions need to align their curriculum with the needs of the industrial sectors to produce graduates with green skills.

Mapping the skills demand revealed several skills needs, skills gaps and skills mismatch. Thus, the study established skills shortages for the growing SMEs. However, the proliferation of these skills among SMEs in SSA countries varies and reveals a drastic need for skills development to reinform a greener and more inclusive society. The findings corroborated the assertion that 21st Century skills core skills like technical, information management, communication, collaboration, creativity, critical thinking, and problem solving are imperative and reinforces innovation and competitiveness.[157] All the listed knowledge areas (environmental accountability, waste management, conservation, recycling, and renewable energy) are important. The findings also indicated that all the groups of work tasks are important and that the two components of green skills development (High level analytical skills, and High-level technical skills) are essential for green skills development. The results also indicate that the respondents rated all the green skills as 'good' and that all the listed priority skills in demand for the future economy are good. The respondents also rated all the skills as important entrepreneurial skills for a green economy and that all the 10 top skills of the year 2025 listed by The World Economic Forum (WEF) as part of a Future of Jobs Report are important. Collaboration, communication, and networking were the skills most mentioned by the respondents as skills considered the most relevant for participation in the green economy. Analytical thinking and innovation, creativity, originality and initiative, and leadership and social influence were mostly considered as most relevant.

The respondents mainly described the country's approach to environmental skills planning and provision for the green economy as 'inadequate'. There was agreement that all the listed entities, including big business, SMEs, schools, and universities, play an important role in developing an appropriately skilled workforce and that government and NGOs are also important players, the former for policy guidelines. All the listed areas of green economy programmes for the development of green jobs

156 Sern, L. C., Zaime, A.F. & Foong, L.M. (2018). Green Skills for Green Industry: A Review of Literature. IOP Publishing Ltd. *Journal of Physics*: Conference Series, Vol. 1019, 1st International Conference on Green and Sustainable Computing (ICoGeS) 2017, 25–27, Kuching, Sarawak, Malaysia.

157 van Laar, E., Deursen, A.J.M., & van Dijk, J.A.G.M. 2017. The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in Human Behavior*. Vol. 72, (July 2017), pp. 577-588.

were found important; and all the listed nine enablers for the implementation of the green economy, including partnership, innovation, science, and technology and regulatory frameworks were deemed critically important. The role that SMEs can play in the development of the green economy was seen as vitally important with the reasons given including helping to develop a green economy, job creation and poverty alleviation and skills development.

All the listed barriers to the development of green skills were regarded as indeed important barriers to the development of green skills. In general, the quality of VET for green skills among SMEs in these countries is regarded as 'not good' but the level of awareness of green skills among education and training practitioners in the three countries is not known. The respondents rated the quality of the development of green skills and capacities for SMEs as neither 'poor' nor 'good', implying that the quality of the development of green skills and capacities for SMEs is also not known. In general, it seems that the development and teaching of green skills through VET is appropriate; and that VET is fit for the purpose and meets the standards expected of them. The respondents were undecided as to whether the curriculum is satisfactory or not. Initiatives or activities that organisations have introduced in support of the green economy include, in Nigeria, partnering with eco-green companies to promote recycling and waste management, training and developing green skills, especially of the youth; and encouraging the green mind set. In Kenya, such activities include engaging in pest scouting, recycling of crop residue to enhance soil fertility, integrating greening in policies and strategies, biogas plant technology to reduce cost and to enhance the use of organic fertilisers. For developing green skills, market-based skills development, community initiatives and private sector collaborations are encouraged.

The findings in this study are compatible with the literature which indicated that there is a dearth of skills development and human capital in Africa. An unknown is whether the curricula used are appropriate. The need for skills development calls for immediate intervention. Higher education and training centres are key to developing green skills. All stakeholders including government, big business and SMEs must be fully engaged and finding in the literature that TVETS continue to expand in popularity and student numbers to align international trends and standards is encouraging. However, it can never be overemphasised that curricula must depend largely on the inherent employability skills and practical collaboration among the stakeholders, more especially, between employers and educational institutions.[158]

[158] McGunable, D & Zizka, L. Employability skills for 21st-century STEM students. *Higher Education, Skills and Work-based Learning,* 2020, pp.591-606.

6.1 Comparison between the countries

Some key variables were compared between countries as shown in Table 2 below.

Table 2: Comparison between countries

Variable	South Africa	Nigeria	Kenya	Total	Difference
Sample size	21	33	10	64	
Organisation type (mostly)	Public	Private	Public	Private	
Core business	Education & Training	Education & Training, Development; IT	Training, Research & Outreach programmes	Education & Training	Education lacking in Kenya
Industry	Education, Construction, & computer and technology	Education & Training, Research, Computer, Technology, Hospitality & Transportation	Agriculture, Fishing & Forestry	Education, training, and research; Agriculture, Fishing and Forestry, Computer and Technology	Education lacking in Kenya, and Agriculture, fishing; Forestry lacking in SA and Nigeria
No. of permanent employees	1-20; more than 80	Less than 20	More than 80	1-20; more than 80; 21-40	In Nigeria, the SMEs are smaller than in the other two countries.
Annual turnover	R1m-R5m; more than R20m; and up to R1m	R1m-5m; more than R20m	more than R20m	more than R20m; R1m- 5m; up to R1m	Similar
Students Enrolment	more than 1,000; up to 200; 801 – 1,000	Less than 200; 201-400; more than 1,000.	More than 1,000.	Less than 200; more than 1000	Similar
Predominant positions in organisation	Managing directors, acting centre managers, two centre managers, curriculum managers.	Chief executive officer, creative designers, or CEOs, five founders, three Managing Directors.	Senior lecturers, researchers, Business Development Officer, Chairman.	Chief executive officer, creative designer, CEO (EA to MD/CEO & HR Administrator), Head of Admin, HOD, MDs or directors, Managers or Acting centre managers	Similar in all countries in terms of seniority but in Kenya, more lecturers participated in the survey.

Variable	South Africa	Nigeria	Kenya	Total	Difference

Highest academic qualification	Honours, Bachelor's, Master's degrees, and Doctorates.	Honours, Bachelor's, Master's degrees, and Doctorates.	Bachelor's degrees and Doctorates.	Honours, Bachelor's, and Master's degrees.	Similar
Field of study	Management, Engineering & Education	Management & Engineering	Agriculture, Fishing and Forestry Agriculture.	Management, Social science, Education, etc.	Management is emphasised in SA and Nigeria but in Kenya, it is Agriculture, Fishing & Forestry
Most relevant skills	Change management Leadership; social influence; analytical thinking and innovation & Reasoning, problem-solving and ideation	Communication, Collaboration and Ability to learn	Leadership and social influence, analytical thinking, and innovation	Collaboration, Communication & Networking	Leadership is more pronounced in SA and Kenya; communication, collaboration & ability to learn is more pronounced in Nigeria
Quality of VET for green skills among SMEs	Poor	poor	Somehow good	poor	In SA and Nigeria, the quality is poor unlike in Kenya
Country's approach to environmental skills planning and provision or the green economy	inadequate	Inadequate	Inadequate	Inadequate	Same
Level of awareness of green skills among educators and practitioners	good.	Undecided	Somehow good	Undecided	In SA, the level of awareness is good, in Nigeria, it is not known, in Kenya it is somehow good.
Quality of the development of green skills and capacities for SMEs	Poor	Poor	somehow good	Undecided	The quality is poor in SA and Nigeria, but somehow good in Kenya.
Perception of the VET curriculum	Undecided	Satisfactory	Not satisfactory	Undecided	Self-explanatory.

6.1.1 Key points

As already noted, statistically, the small size of this study might have influenced its findings.

To summarise the key findings in point form:

- In Kenya, there is a need to emphasise education for better green skills development and that more participation from the agricultural, fishing and forestry sector could possibly be encouraged in South Africa and Nigeria.
- In Nigeria, big business needs to be encouraged to participate in green economy development.
- Seemingly, while leadership skills could be enhanced in Nigeria, communication and collaboration skills need to be encouraged both in South Africa and Kenya.
- Improving the quality of VET for green skills among SMEs needs to be addressed in all countries, especially in South Africa and Nigeria.
- Each country's approach to environmental skills planning and provision for the green economy needs improvement.
- The level of awareness of green skills among educators and practitioners in Nigeria and Kenya needs to be increased.
- The quality of the development of green skills and capacities for SMEs should be addressed, especially in South Africa and Nigeria.
- The VET curriculum needs attention especially in South Africa and Kenya.

There is a clear relationship between green skills and entrepreneurship. The EEVT should be infused with sustainability and resilience paradigms and ESD presents a broad framework for achieving this. The demand for green skills created by environmental regulation presents an opportunity to educate and train entrepreneurs to be ecologically sensitive and resilient in resource stewardship.

Chapter 7 Conclusion

This study represented systematic empirical research to establish the demand for skills needed in a greener society and as mentioned, employed a data-driven methodology to map green skills and analyse how the demand for these skills responds to environmental policy and regulation.

By investigating the skills demand in SSA for a greener society, this study established that 21st century skills are very important for SME development in a greener society. The mapping of the skills demand exposed certain skills needs and skills gaps which require attention. Crucially, curricula must be aligned with ESD. The pedagogy for

education for sustainable development can enhance green skills development and is especially important within TVET contexts.[159] The proliferation of skills among SMEs in the three SSA countries surveyed vary, revealing a drastic need for skills development to reinforce a greener and more inclusive society.

It was noteworthy that of the Sixty-four (64) questionnaires that were completed, the majority (50.0%) of participants were private organisations, with some public organisations (37.5%). More importantly the core business of most of the organisations was education, training, and development (31.7%). These educational institutions enrolled students up to more than 1000 students and most of the respondents were at decision making level such as chief executive officers, MD, Head of Administration, and Head of Department. Most respondents were well educated, having from a senior certificate to a doctorate degree in fields of management, social sciences, education, engineering. Therefore, curriculum transformation, interdisciplinarity and sustainability issues should not be difficult. However, given the incoherent green economy planning evident in the findings, it is plausible more consultation and collaboration is needed.

To summarise, the following conclusions can be drawn:

- All the listed 21st Century Skills-Core skills and Contextual- skills are essential green skills for SMEs and among them, problem solving, and communication are very important.
- All the listed knowledge areas (environmental accountability, waste management, conservation, recycling, and renewable energy) are important.
- The respondents agreed with the definition of green skills.
- All the groups of work tasks are important.
- The two listed components of green skills development (High level analytical skills, and High-level technical skills) are important for green skills development.

This finding is congruent with other findings that key green skills are high-level analytical and technical know-how related to the design, production, management and monitoring of technology.[160]

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[159] Pavlova, M., Chen, C.-S, *Facilitating the development of students' generic green skills in TVET: an ESD pedagogical model* in: TVET@Asia, (12), 1-23., 2019. Retrieved from: https://tvet-online.asia/wp-content/uploads/2020/03/pavlova_etal_issue12.pdf

[160] Vona, F., Marin, G., Consoli, D. & Popp, D. (2015). *Green Skills*. Working Paper 21116, National Bureau of Economic Research, Cambridge

- The respondents rated all their green skills as ‘good’.
- All the listed priority skills in demand for the future economy were rated as ‘good’.
- All the listed skills as important entrepreneurial skills for a green economy.
- All the 10 top skills of the year 2025 listed by The World Economic Forum (WEF) as part of a Future of Jobs Report are important.
- Collaboration, communication, and networking are the most relevant skills for participation in the green economy.
- Of all the listed skills, analytical thinking and innovation, creativity, originality and initiative, and leadership and social influence are the skills most relevant for a green economy.
- Each country’s approach to environmental skills planning and provision for the green economy is ‘inadequate’.
- All the listed entities, including big business, SMEs, schools, and universities play an important role in developing an appropriately skilled workforce. Government for policy directions/NDE and NGOs are also important players.
- All the listed areas of green economy programmes for the development of green jobs were found important.
- All the listed nine enablers for the implementation of the green economy, including partnership, innovation, science, and technology as well as regulatory frameworks are critically important.
- The role that SMEs can play in the development of the green economy is vitally important; reasons given include, helping to develop a green economy, job creation and poverty alleviation, skills development.
- All the listed barriers to the development of green skills, are indeed important barriers to the development of green skills.
- In general, the quality of VET for green skills among SMEs in South Africa, Nigeria, and Kenya, is poor.
- The level of awareness of green skills among education and training practitioners in the three countries is not known.
- The respondents rated the quality of the development of green skills and capacities for SMEs as neither poor nor good, implying that the quality of the development of green skills and capacities for SMEs is not known.

- In general, it seems that the development and teaching of green skills through VET is appropriate.
- VET is fit for the purpose and meets the standards expected of them.
- The respondents were undecided as to whether the TVET curriculum is satisfactory or not.

Developing green entrepreneurship must coincide with SME support. The many young emerging entrepreneurs who are part of the growing green entrepreneurship phenomenon can significantly impact economic growth within the parameters of sustainable development. Although a country may have a strong legislative framework for environmental sustainability, its traditional economic context usually remains assertive. Dependence on coal and the mining sector for generating power and the substantial employment figures involved, makes the socio-economic implications of a green transition complicated. Thus, whilst the policies support the greening of the economy, socio-economic realities may constrain such efforts.

The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) recently published a discussion paper exploring the implications for Technical and Vocational Education and Training (TVET) in creating a workforce which will be able to address not only the labour market needs for the green economy but also the socio-economic dimensions of this transformation processes ('just transition'). The paper comprises seven (7) separate research theses which explore various aspects such as the policy dimension, the anticipated changes in labour markets and how TVET systems need to respond.

The GiZ document already mentioned evaluates the South African context to provide key areas of intervention required by the South African TVET system[161] and regards the TVET system as central to orienting education towards sustainability (ESD) and ensuring that such reform is inclusive, relevant, and attractive. The GiZ document mentions several additional features of a green economy that must be clarified to achieve global consensus for collective action and maintains that it is a fallacy to think that a green economy can be engineered through policies and regulations only. A just transition to a green economy also needs to be driven by entrepreneurs who respond to policy incentives through innovation in management. The emphasis of the term 'green innovation' must be on 'innovation' rather than what is generally perceived to be 'green'. Government must focus more on the creation of an enabling

[161] Freimann, K. & Magnus, G. (2023). *Skills for a Just Transition to a Green Future: Measuring the South African TVET System and providing input to support its development.* GIZ- Career Path Development for Employment project, Johannesburg.

environment for large-scale innovations that contribute to the global green transformation of an entire industry rather than merely subsidising green niche markets.[162]

The appropriate level of analysis for this study was at the skills level where green skills were viewed as knowledge, abilities, values, attitudes, and skills that span various work roles and occupations with a common purpose, namely, sustainable development. Within these conceptual boundaries for green skills, it is possible to relate green skills to green occupations or green jobs. Given the different effects that green economy activities and technologies may have on different occupations, a more prudent approach of greening of occupations is needed. The 'greening' of occupations refers to the extent to which green economy activities and technologies increase the demand for existing occupations, shape the work and worker requirements needed for occupational performance, or generate unique work and worker requirements.[163] However, this impact does not entail significant changes in the work and worker requirements of the occupation. The work context may change, but the tasks themselves do not. The essential purposes of the occupation remain the same, but tasks, skills, knowledge, and external elements, such as credentials, have been altered.

The study has shown the importance of skills development among SMEs in a green economy and how this need is attributed to the current changes in society and the imperative of the green economy. Most importantly, the study emphasised the importance of strategic positioning green skills in the existing curricula. The geological age dating from the impact of human activity on the global environment, called the Anthropocene epoch, must be transformed into a naturogenic era where sustainability permeates all human activity. Everyone must play their part and SMEs and the TVET sector are key role players in an ecosystem of environmentalism.

Chapter 8 Recommendations

Apart from the findings as already outlined, this study also uncovered certain gaps in developing entrepreneurial green skills among SMEs. Whilst the study found evidence of green skills development for SMEs, such development is not yet significant and more substantial interventions in education and training are needed.

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[162] Farinelli, F., Bottini, M., Akkoyunlu, S. & Philipp, A. (2011). *Green entrepreneurship: The missing link towards a greener economy.* Swiss NCCR. Working Paper No 2013/41| June 2013.

[163] 102. Dierdorff, E.C., Norton, J.J., Drewes, D.W. & Kroustalis, C.M. (2009) *Greening of the World of Work: Implications for O*NET®-SOC and New and Emerging Occupations.* North Carolina State University, National Center for O*NET Development.

More active involvement by big business is also crucial for upskilling SMEs for greening the economy. The following recommendations are given for each country, based on the specific findings of that country.

8.1 South Africa

More must be done if meaningful green skills development is to be achieved in South Africa. Necessary action to be taken would include, for example, revisiting the TVET curriculum to bring it in line with the demand for green skills development, and re-examining the country's overall approach to environmental skills planning. Such action would increase the quality of VET for green skills development, and the quality of the development of green skills and capacities for SMEs.

8.2 Kenya

The country's approach to environmental skills planning and provision for the green economy needs attention. The following steps could be taken:

- The level of awareness of green skills among education and training practitioners in Kenya should be enhanced.
- The quality of the development of green skills and capacities for SMEs in the country also needs to be improved.
- In addition, the TVET curriculum needs serious attention to bring it to an appropriate level.

8.3 Nigeria

The country's overall approach to environmental skills planning and provision for the green economy needs to be re-visited by addressing the following:

- All barriers to the development of green skills (especially those listed in this report) need to be addressed, for example, the lack of investment in the green economy, insufficient understanding of a green economy, and lack of planned reskilling for green jobs.
- The quality of VET for green skills among SMEs in Nigeria needs to be improved.
- The awareness of green skills among education and training practitioners in the country needs immediate attention.
- The development of green skills and capacities for SMEs also need to be improved.

8.4 Further study

We recommend that more research must be done using a larger random sample size of at least 100 respondents in the three countries under study. Such research would enable a factor analysis to identify the key components of green skills development in each country as well as those that impact the green economy in general.

In addition, it is recommended that the ten most common green skills demanded by various industrial sectors (the skills of design, leadership, management skills, energy, city planning, landscaping, communication, waste management, procurement, and finance) be included in all green skills development curricula. Such curricula would align skill training institutions with the needs and wants of the industrial sectors. Revision and renewal of curricula to produce skilled people is a crucial first step to reinforce the greening transition.

It is also recommended that ESD and Innovation in teaching and learning be prioritised to improve the quality and relevance of education. The role of TVETS in the four types of innovation, namely, product innovation, process innovation, business model innovation and management innovation cannot be underestimated or understated. TVETS are the institutions best suited to reskill and upskill SMEs in a green economy.

Furthermore, it is recommended that Education for Sustainable Development (ESD) and Entrepreneurship Education and Vocational Training (EEVT) be combined with real life, work-integrated learning for an immersive learning experience. This recommendation was also the finding of a study focused on assessing students' entrepreneurial skills development in live projects which found that the nature and practice of an experiential learning approach is a differentiating factor. The results of the study indicated that the development of entrepreneurial skills can be improved by providing a learning environment in which students interact with real business people in live projects.[164] The mainstreaming of ESD and EEVT should be complemented by local knowledge systems and the upskilling TVET staff in green skills and ESD. TVETS must respond to the changing skills demand, adapt existing occupational profiles, and develop new ones.[165]

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164 Chang, J. & Rieple, A. (2013). Assessing students' entrepreneurial skills development in live projects. *Journal of Small Business and Enterprise Development*. Vol. 20 (1), pp. 225- 241.

165 Freimann, K. & Magnus, G. (2023). *Skills for a Just Transition to a Green Future: Measuring the South African TVET System and providing input to support its development.* GIZ- Career Path Development for Employment project, Johannesburg.

A recommendation by the ILO for a good mix of foundational, technical (hard) and core (soft) skills, including science technology, engineering, and mathematics (STEM) skills for an inclusive and just transition to a greener future, is also applicable to the three countries of this study.

Mainstreaming the green transition through the technical and vocational education and training (TVET) and lifelong learning systems in this way would increase the chances of advancing a just transition.[166]

Green technology innovation is an area where more research and development are needed and ESD and EEVT can be catalytic in countries becoming independent and subsistent in technology. Being an enabler of green technology development and diffusion will boost the green transition.

Contextual factors play a big role in SME development, and it is recommended that contextual factors in entrepreneurship development be prioritised. This recommendation is also supported by the findings of a study on SMEs and sustainable entrepreneurship in South Africa which revealed that the characteristics of an SME, Government Support, Management Skill, Good employee-employer relationship, and Start-up Capital are correlated to sustainable entrepreneurship. It found that these factors have a significant impact on the increase or otherwise of sustainable entrepreneurship amongst the SMEs. The study suggested that entrepreneurs and business partners must continuously pursue novel ideas as is characteristic of an SME and maintain an opportunity-seeking perspective with employees while controlling the risks associated with high-risk ventures that bring financial achievements.[167]

Further recommendations, based on the findings in respect of TVETS, are:

- A rational alignment of green agendas and skills development and the incorporation of TVETS in each country's development strategies and all environmental and sustainability policy areas.
- TVETs must be flexible to changing skills requirements, teach core skills and upskill and re-skill workers for the green economy.
- Integrate Education for Sustainable Development (ESD) and local knowledge (IKS) in TVET curricula.

166 ILO, 2022. *Skills development for a just transition*. October 2022. ILO Policy brief.

167 Ogujiuba, K.K., van Rensburg, N. Mauzu, N. B, Ogujiuba, C. B. Estelle.(2021). *SMEs and Sustainable Entrepreneurship in South Africa: Impact Analysis of Contextual Factors in the Services Sector.*

- Ensure continuous staff development in green skills and ESD for all TVET personnel.

This study clearly showed the important role that SMEs play in the green economy. Through innovation and risk investing SMEs contribute to economic growth as well as greening the economy. Green entrepreneurship is driven by entrepreneurs who respond to policy incentives through innovation in management and technology. Government cannot dictate the direction that entrepreneurship takes; but it needs to provide an enabling environment for green entrepreneurship to flourish.

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