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THE IMPACT OF PRO--ENVIRONMENTAL ECONOMIC PROJECTS ON THE IMPLEMENTATION OF SUSTAINABLE DEVELOPMENT GOALS IN KENYA

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ABSTRACT

Due to the degradation of the environment emanating from human use and interconnectivity it was found necessity to introduce the idea of sustainable development to combat climate change and to protect the environment. The impact of pro-environmental economic projects on the implementation of sustainable development goals can be understood within the context of the sustainable development paradigm. Pro-environmental economic initiatives could make a substantial contribution to Kenya's efforts to achieve its sustainable development targets, notwithstanding any potential obstacles. This study investigates the impact of pro-environmental economic projects on the achievement of Sustainable Development Goals (SDGs) in Kenya, a developing nation facing complex socio-economic and environmental challenges. The research analysed a dataset comprising 31 diverse pro-environmental projects, utilizing multiple variables to examine their impact on SDGs. The key variables included direct employment generation, pro-environmental impact, project cost, and productivity. The study employed statistical analyses, including correlation analysis and multiple regression, to investigate the relationships between these variables and the SDG Index. The findings revealed that direct employment generation emerged as a critical driver of SDG implementation in Kenya, demonstrating a strong positive correlation with SDG achievement. However, other variables, including pro-environmental impact, project cost, and productivity, did not exhibit statistically significant relationships with the SDG Index. These results underscored the multifaceted nature of sustainable development and highlighted the central role of employment generation in advancing Kenya's progress towards SDGs. The study's implications extend to both policy and practice, emphasizing the importance of prioritizing employment-centric initiatives within the broader framework of sustainable development. Additionally, the research underscored the need for a comprehensive and nuanced approach that considered various facets of sustainability to effectively address the complex challenges faced by developing nations like Kenya on their path to achieving SDGs.

Keywords: Pro-Environmental, Economic Projects, SDG Index, Carbon Intensity, Productivity Output, Sustainable Development Goals.

INTRODUCTION

Recent years have seen a heightened discussion on improving sustainable financing of SDGs in addressing risks associated with climate change and the need to support the development of green finance (Cunha, Meira & Orsato, 2021). This discussion has been fuelled by the growing public awareness of the risks posed by climate change and the political commitment of the international community to address these challenges. The necessity to introduce the idea of sustainable development resulted from the gradual degradation of the environment caused by human use. As a result, protecting the environment and the natural resources for future generations has become a global imperative.

Since the Sustainable Development Goals (SDGs) were adopted by the UN in 2015, Kenya has been trying to achieve them. A contextual examination of Kenya's SDG implementation reveals a number of issues that require attention. Oyoo and Were (2019) state that because the resources are not enough to fully execute the SDGs, financing sustainable development is still a major problem. The SDGs have not advanced as planned because state institutions and non-state entities have not coordinated (United Nations, 2018). Another issue is gender disparity, as Kenya's patriarchal system makes it difficult to achieve gender equality (United Nations Environment Programme, 2016). In addition, the SDGs have been seriously threatened by climate change-related catastrophes including droughts and floods (Ministry of Environment and Forestry, 2018).

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To overcome these obstacles and accomplish the SDGs in Kenya, all stakeholders must work together. Pro-environmental economic projects, according to Tietenberg and Lewis (2016) are activities designed to lessen adverse environmental effects while also fostering economic development. These initiatives could include a variety of interventions, such as the adoption of green technologies, sustainable production methods or the creation of new markets for eco-friendly goods. On the other hand, pro-environmental economic projects are defined more specifically by Van der Horst, Vermeylen and Aguiar (2018) as efforts that expressly seek to create economic value from natural resources. These initiatives could be eco-tourism operations, eco-certification programs for agricultural products, or ecosystem services payment schemes that offer financial incentives to landowners for protecting natural areas. Therefore, pro-environment economic projects are environmentally friendly projects with a positive economic impact.

Pro-environmental economic projects are receiving more and more attention on a global scale as a means of advancing sustainable development by encouraging economic expansion while reducing adverse environmental effects. The acceptance of such initiatives has been a point of contention in Kenya. On the one hand, supporters contend that funding sustainable development projects can result in long-term economic gains by luring green investment, generating new jobs, and raising productivity. For instance, the National Climate Change Action Plan and the Green Energy Initiative, which both aim to support the growth of renewable energy sources, are two pro-environment economic initiatives that the Kenya government has put into action (Kagunyu & Marwanga, 2018). On the other hand, detractors claim that these initiatives may not always result in an equitable distribution of economic advantages and may even have

unfavourable social and environmental effects if poorly thought out and executed. For instance, several experts have expressed worry over the potential for major hydropower projects to uproot local residents and harm ecosystems. The disputes regarding the role of sustainable development in accomplishing environmental and economic goals are reflected in Kenya's debates over the implementation of pro-environmental economic projects (Kagunyu & Marwanga, 2018). Pro-environmental economic enterprises, however, can make a substantial contribution to the nation's sustainable development goals with careful design and implementation.

The United Nations approved the Sustainable Development Goals or Global Goals in 2015 which serve as a global initiative to combat destitution, conserve the environment, and ensure everyone can peacefully live and prosper by 2030 (WHO, 2015). These 17SDGs recognize the interconnections between various areas, acknowledging that actions taken in one sphere will affect outcomes in others. They emphasize on the importance of achieving sustainable development by maintaining a harmonious equilibrium between social, economic and environmental sustainability. Nations have agreed to give priority to those lagging behind while making progress. The objective of Sustainable Development Goals is to eliminate AIDS, hunger, poverty and discrimination against female of all ages. Achieving the SDGs in every setting necessitates the involvement of the entire population, utilizing their creativity, expertise, technological advancements, and financial resources (Macharia, 2019).

Sustainable development goals which are addressed as Kenya Vision 2030 is the country's development programme from 2008 to 2030 which was launched by the then President Mwai Kibaki in 2008. The aim of the development program was to convert the country into a newly industrialized, middle-income country that could provide its citizens, high quality life by 2030 in a clean and secure environment (Ngare, 2017). The vision was based on three pillars which included economic, social and political pillars. Under the economic pillar, through an economic development program that spans all of Kenya, Kenya aspires to increase the well-being of all Kenyans. Kenya aspires to create a fair, unified society with social fairness in a safe and secure environment under the social pillar. Therefore, it offers extensive social interventions designed to raise everyone in Kenya's standard of living. As a result, Kenya wants to use science, technology, and innovation (STI) as a tool for implementation to improve a variety of sectors, including the environment, water, and sanitation (Ngare, 2017). As far as the political pillar is concerned Kenya as a country is keen on promoting a democratic society where decisions impacting on the lives of Kenyans are made through a consultative process before being ratified by Parliament.

Kenya's long-term development strategy, Vision 2030, is implemented through medium-term plans (MTPs), which span over a period of five-years. To achieve quick, strong, inclusive, broad based, and sustainable economic growth, the third MTP, which spans from 2018 to 2022, mainstreams the Agenda 2063 of the African Union and the SDGs. Additionally, including the SDGs into sub-national County Integrated Development Plans (2018–2022), action plans, and performance contracts places Kenya in a better position to implement both Agenda 2063 and the SDGs. One of the targets of SDGs is to assist in enhancing resilience of individuals living in poverty and vulnerable situations, while simultaneously reducing their susceptibility and exposure to diverse economic, social, and environmental shocks and disasters including extreme weather events linked to the impacts of climate change (VNRCSR, 2020).

In the Agenda 2063 of Sustainable Development, all the seventeen goals are interrelated and interlinked. As a result, there is a connection between the SDGs and the success of the policies that are put in place to accomplish each objective (Collste, Pedercini & Cornell, 2017). There is need to develop sustainable investment strategies over the following ten years that will create the ideal conditions, or "enabling framework," to support and encourage governmental and non-governmental investments necessary to transition towards an economy that is climate-neutral, environmentally sustainable, economically competitive and socially inclusive. Efforts to create a financial system that promotes sustainable growth have been spearheaded by sustainable investment, which will accelerate the transition to a low-carbon, resource-efficient, climate-resilient development, and sustainable economy (Claringbould, Koch & Owen, 2019).

In the 2018 global Sustainable Blue Economy Conference held in Nairobi, the Kenyan government in collaboration with the Canadian and Japanese governments among other 184 governments had deliberations with the objective of ensuring that the SDG are met (Muigua, 2018). The main aims were to utilize the immense possibilities offered by the oceans, seas, rivers and lakes and to enhance the well-being of all individuals, with a specific focus on those in developing nations, women, youths and the indigenous communities. This involves employing the most recent advancements in technology, scientific discoveries and successful methodologies to foster prosperity while also preserving these water resources for the benefit of future generations. According to Van Wyk (2015), the conference creates a vision for a sustainable present and future generation, encompassing economic stability, social inclusivity, and environmental resilience. Achieving the ambitious Sustainable Development Goals (SDGs) is contingent upon global collaboration to promote the sustainable use and preservation of natural resources in the Blue Economy. Through innovative financing, emerging technologies, capacity building, effective governance, and investment in underdeveloped sectors of the Blue Economy, current developmental obstacles can be transformed into opportunities for individuals and communities Worldwide (Seliger, 2012). This calls for global leaders in both public and private sectors to prioritize the utilization of investments, both individually and collaboratively, so as to optimize the advantages obtained from the Blue Economy. Additionally, these investments should aim to bolster the resilience of communities and the environment (Bennett *et al.,* 2019).

Sustainable development goals (SDGs) worldwide are becoming more and more significant to pro-environment economic ventures which can be emurated and implemented in Kenya in order to achieve sustainable development. To encourage sustainable growth of the nation, the Kenyan government has put into action a number of economic and environmental programs (Government of Kenya, 2018). For instance, the National Climate Change Action Plan (NCCAP) was created to assist lessen the effects of climate change (Kibicho, 2019). The plan provides a framework for implementing numerous climate change efforts, such as afforestation, renewable energy, and sustainable land managemen. The Green Energy Initiative targeted the achievement of 17SDGs on access to affordable and clean energy, while the NCCAP helped to achieve SDG 13 on climate action (Government of Kenya, 2018). The fear is that implementing certain projects such as the construction of big hydroelectric plants might uproot local populations and harm the ecosystem (Kibicho,2019).

The global perspective contends that certain environmentally friendly economic initiatives could be expensive to carry out and their advantages might not extend to the most disadvantaged groups such as the rural and urban poor of developing countries such as Kenya. Arguably, funding sustainable agricultural methods like agro-forestry and conservation agriculture could advance environmental

preservation. Assisting in the achievement of SDG 2 on ending hunger while encouraging sustainable tourism might support SDG 8 on decent jobs and economic growth while preserving Kenya's unique biodiversity (United Nations Development Programme, 2021).

In Kenya, accomplishing sustainable development objectives might be significantly aided by the implementation of pro-environment economic projects. To minimize undesirable social and environmental effects, these projects must be carefully planned and carried out. The Kenyan government must make sure that the most disadvantaged communities, particularly those who live in rural regions, benefit from these programs.

EMPIRICAL REVIEW

The empirical literature on sustainable development goals and implementable projects which adhere to environmental requirements while promising economic gains unearths studies which have been extensively documented. Internationally, Trzcieliska and Kaps (2021) undertook an empirical study to examine managers' perceptions of environmental changes in their workplaces and their environmental advocacy in adoption of sustainable development propelled by the European Green Deal. 100 medium and large businesses from a range of Polish industry sectors were surveyed using the CAPI approach. The results showed that businesses are not proactive in responding to opportunities presented by the EU Green Deal and do not consistently detect changes occurring in their macro-environment. Islam and Managi (2019) conducted a study with the goal of measuring sustainability and assessing the difficulties in reaching the Sustainable Development Goals (SDGs) through natural capital accounting. In order to quantify the nation's renewable and non-renewable natural resources, such as forest cover, farmland, fisheries, fossil fuels, and minerals, the study employed the natural capital accounting approach. The results show that while successful forestry in India has improved the wellbeing of its citizens, other renewable and non-renewable resources continue depreciating due to economic advancement and increased numbers. Jakubczak *et al.,* (2021) conducted a study to pinpoint the main security concerns associated with integrating sustainable development principles into business operations. To accomplish their goals, the researchers employed a qualitative research methodology that included a critical study of the literature, comparison analysis, and the analysis of the available data. The study findings showed that the conventional strategy for reviving economic activity in times of crisis, which entails providing governmental aid programs to firms, ignores the incentives for companies to engage in pro-environmental commercial endeavours. The study also discovered that, in spite of the programs put in place to support sustainable development, the disparity between the wealthy and the poor keeps rising, leading to conflict both globally and locally.

The "EREJ" project, which was carried out with students at the University of Rzeszów in Poland, was the subject of a study on Effective Pro-Environmental Education as a Key Component of Economic Infrastructure and Sustainable Development conducted by Kostecka *et al.,* (2022). To ascertain how the project affected students' pro-environmental behaviour and knowledge development, the authors used an evaluation methodology based on surveys. The study's conclusions demonstrated that the initiative increased students' understanding of attitudes toward the environment while also enhancing their abilities in a number of areas, including collaboration and communication. The factors that influence students' pro-environmental conduct in a Malaysian educational setting were examined in a study by Yusoff *et al.,* (2020). A survey of 72 students utilizing the partial least squares (PLS) approach performed the data collection, which had a single training centre as its only study region. The results showed that pro-environmental conduct was positively influenced by environmental commitment, environmental consciousness, a green lifestyle, and green self-efficacy.

Locally, Atieno and Njoroge (2016) carried out a qualitative study in order to investigate the idea of ecotourism as a metaphor for pro-environmental behaviour in Kenya. The researchers examined snippets from supply-side hypertexts to determine the reasons why the term "ecotourism" was used in five focus areas determined by the Ecotourism Society of Kenya. The readings were then contrasted with The International Ecotourism Society's concept of ecotourism. The results demonstrated that, in practice, the idea of ecotourism did not closely adhere to its defining characteristics as an environmentally friendly approach. Instead, other interests like product promotion and corporate image were served by economic and social logic. Chege and Wang (2020) undertook a study on how environmental sustainability practices inside SMEs in Kenya can affect the performance of technology innovation. The data gathered from 204 small enterprises were analysed using hierarchical regression models. The study findings showed that technological innovation, especially when integrated with environmentally friendly practices, had a favourable effect on SME performance. Profitable businesses that go above and above their contractual obligations to promote charitable causes and social welfare frequently enjoy greater financial success. The study also discovered that a company's performance and reputation among stakeholders can be improved through innovation from management and staff participation in environmental protection activities. With a focus on the Sustainable Development Goals, Hinson, Lensink, and Mueller (2019) sought to investigate how FinTech is transforming agribusiness in poor nations (SDGs). Key stakeholders in Ghana's agribusiness industry participated in semi-structured interviews as part of the study's qualitative research methodology. The study revealed that FinTech might significantly contribute to achieving SDGs in underdeveloped nations, especially in terms of supporting ethical production and boosting profitability without using more natural resources. However, the report also emphasized significant dangers and constraints, such as the requirement for significant infrastructure investments and capacity creation on a wide scale.

RESEARCH PROBLEM

The accomplishment of SDGs in Kenya is hampered by several aspects, including gender inequality, lack of synchronization between governmental and non-governmental entities, extreme meteorological conditions, such as periodic droughts followed by floods, and insufficient financial support from development partners due to misuse of funds. In addition, contamination of the air, water, and land has increased as a result of extensive human activity (Oyoo & Were, 2019). Additionally, key security challenges, the amount of pollution, and greenhouse gas emissions are not being sufficiently addressed despite the fact that there are continuous pro-environmental economic projects meant to reform the economy and incorporate sustainable development concepts. This makes it more difficult to achieve long-term, meaningful and constructive trends in sustainable development. Furthermore, the implementation of ecological policies and spending has not kept pace with the magnitude of the objectives of sustainable development and pro-environmental transformation of the economy (United Nations Development Programme, 2016).

The requirement is around $4.5 trillion yearly to reach the Sustainable Development Goals in order to abolish extreme poverty by 2030, significantly more than can be provided by multilateral development banks or donors alone. Even though the World Bank Group devised

the MFD strategy to meet this problem, which comprises collaborating with governments to bring in the private sector while maximizing the use of limited public resources, sustainable financing of SDGS is required given that the extent and reach of the programs that Civil Society Organisations (CSOs) are putting in place to guarantee that specific SDG Targets are achieved are constrained by lack of funding. The key area where three quarters (75%) of CSOs need assistance, according to the Voluntary National Review - Civil Society Report (2020), is with financing. Aligning and improving institutional structures in the counties is as well necessary to find solutions and ways to better planning, mainstreaming, and localizing the execution of the Sustainable Development Goals (SDGs). The creation of an investment-friendly policy and a supportive legal environment (legislation and oversight) are the key issues that the Counties face in this area according to Mugo and Kilonzo (2017).

At the county level, the pursuit of Sustainable Development Goals (SDGs) is contingent upon the identification and assembly of viable turnaround projects. These projects serve as tangible manifestations of the SDGs, addressing localized needs and contributing to the broader sustainable development agenda. The process of identifying such projects is comprehensive, encompassing needs assessments, community engagement, and collaboration with various stakeholders (United Nations, 2020). Importantly, the viability and sustainability of these projects must be rigorously evaluated, taking into account factors such as economic feasibility, social impact, and environmental sustainability (Smith & Johnson, 2019). This meticulous evaluation ensures the long-term success and effectiveness of these projects in advancing the SDGs.

The availability of reliable data and robust information and communications technologies (ICT) infrastructure is fundamental to effective sustainable development (Jones *et al.,* 2021). Trustworthy data serves as the foundation of informed decision-making, allowing counties to tailor their initiatives to the unique challenges and opportunities within their jurisdiction. This includes the implementation of reliable data collection mechanisms, rigorous quality assurance processes, and investments in ICT infrastructure to enable the efficient collection, management, analysis, and dissemination of accurate and timely information (Smith, 2018). Data-driven policymaking, facilitated by these components, plays a pivotal role in achieving and monitoring progress toward SDG targets (Brown & Davis, 2020). All the initiatives lamented on above calls for finances which are in short supply.

Human capital development emerges as a critical component of county-level advancement in the context of SDGs (Johnson & Miller, 2019). Investment in the skills, capabilities, and well-being of the county's workforce is essential. This encompasses education and skills development programs that foster a capable and adaptable workforce capable of driving progress across various sectors (World Bank, 2020). Additionally, access to quality healthcare and social services ensures physical and social well-being of county residents, fostering a healthy and productive population (Smith & White, 2021). Supporting local businesses and entrepreneurship is instrumental in stimulating economic growth and creating job opportunities within counties (Anderson *et al.,* 2017). Furthermore, active community engagement empowers local populations to actively participate in shaping their development agendas (Johnson et al., 2022) which means that capacity building cannot be ignored.

The impact of pro-environmental economic projects on the implementation of sustainable development goals can be understood within the context of the sustainable development paradigm. This paradigm emphasizes the importance of a sustainable financing model based on value- and social responsibility-oriented management. The model emphasizes the need to not only uphold social and ecological interests but also to achieve economic goals (Macharia, 2019). This highlights the crucial role of pro-environmental economic projects in creating a sustainable and balanced approach to economic development that considers environmental and social impacts in addition to economic growth.

Several studies have been done on pro-environmental economic projects and implementation of sustainable development goals in Kenya although only few of these studies establish the effect of pro-environmental economic projects on implementation of SDGs in Kenya. The study by Mugo and Kilonzo (2017) was on the effects of financial inclusion at the community level, with an emphasis on reducing poverty and generating jobs in Kenya. Dal Maso *et al.,* (2020) examined the impacts of nationally decided contributions on sustainable development casing the mini-grids in Kenya. Vane et al. (2022) carried a study in Nairobi, Kenya on effects of urban slums and informal settlements' organic pollutants on environmental goals and river sediment quality while Leal Filho *et al.,* (2019) in their study reveals that SDGs help to better understand mini grid's ability concerns. Valdivia, Antler, and Stoorvogel (2017) did a study on Designing and assessing Sustainable Development Pathways for Semi-Subsistence Crop-Livestock Systems: Lessons from Kenya. The current study addresses a conceptual gap and a research question of: What is the effect of pro- environmental economic projects on implementation of sustainable development goals in Kenya?

CONCEPTUAL FRAMEWORK

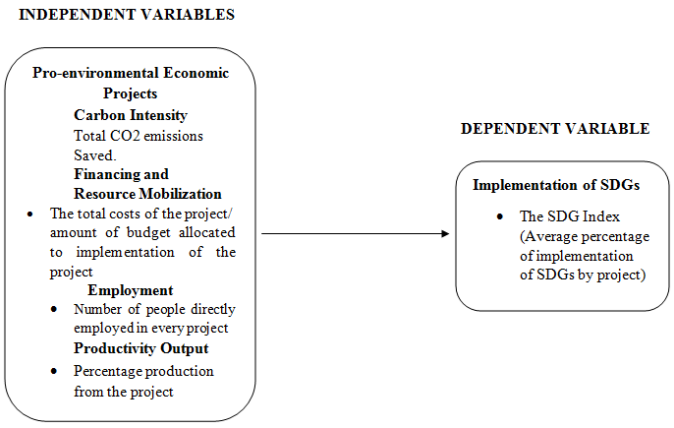


Figure 1: Conceptual Framework

MATERIALS AND METHODS

The population of the study comprised all the pre-environmental economic projects in Kenya since the study aimed at establishing how these projects impact the execution of SDGs in Kenya. The population consists of 53 power supply projects in Kenya, 40 water supply in Kenya and 14 land protection and irrigation projects in Kenya adding up to a total of 107 major pro-environmental economic projects in Kenya. Purposive sampling, which entailed choosing cases that were most likely to give the pertinent information required for the study was used to select 10 power supply projects, 10 water supply projects and 10 land protection and irrigation projects making a total of 30 projects (Ministry of Energy and Petroleum, 2021; National Irrigation Authority, 2021; Ministry of Water, Sanitation and Irrigation, 2021). Purposive sampling was employed in this study with the intention of identifying the most important initiatives that have a bearing on SDG implementation.

Secondary data for use in the study was collected using data collection sheet. To collect secondary data on the pre-selected environmental economic projects in Kenya, the study utilized various sources of information. The source of secondary data was government reports, project websites and review of relevant databases, including those related to sustainable development goals and pre-environmental economic projects in Kenya. Data analysis was done using several steps, starting with data cleaning to ensure that the data was free of errors, inconsistencies, and free of missing values. Once the data was cleaned and before applying multiple linear regression analysis, the study conducted several diagnostic tests to ensure the robustness of the model that was used. These tests included normality, linearity, heteroscedasticity, multicollinearity and autocorrelation. Using SPSS version 29, the data analysis for the study combined descriptive and inferential statistics. The gathered data on the pre-environmental economic projects and implementation of SDGs in Kenya was analysed using descriptive statistics such as range, mean, median and standard deviation. The distribution and leaning of the data were evaluated using skewness and kurtosis. Inferential statistics were also employed to test the study's hypotheses. Multiple linear regression and correlation analysis was used to investigate how both variables relate. The change in the dependent variable as a result of changes in the independent variables was calculated using the multiple linear regression analysis.

The regression model depicted below explains the expected outcomes.

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$

Whereas B_0 is the intercept and ε is the error term

Y represents the implementation of SDGs in Kenya (The SDG index and dashboards).

X_1 represents pro-environmental economic projects (Total tons of CO2 emissions saved in the project).

X_2 represents financing and resource mobilization (The expected project cost).

X_3 represents Direct Employment Generated (natural logarithm of direct employment generated by the projects)

X_4 represents Production output (The ratio of total capacity achieved by the project over the total capacity expected).

$\beta_1, \beta_2, \beta_3$ and β_4, are coefficients of X_1, X_2, X_3, and X_4 respectively.

Data Analysis

The collected data seeking to assess the impact of pro-environmental economic projects on the implementation of sustainable development goals in Kenya was analysed aimed at seeking to determine the descriptive statistics for each of the study variable. The study further sought to carry out diagnostic tests to ensure that no spurious regressions were undertaken by the study. Analysis of the variables was undertaken by using both correlation and regression analysis where the findings of the study were clearly indicated and the interpretation of the findings well captured and related to findings from previous related studies.

Descriptive Statistics

The study undertook descriptive statistics that sought to calculate the mean, standard deviation the minimum and maximum value, the distribution of data was also expressed in terms of the skewness of the data and kurtosis. The descriptive statistics provided valuable insights into the key characteristics of the study variables, including their central tendencies, variabilities, and distribution shapes. These statistics served as a foundation for further analysis and interpretation of the data in the study and are summarised in table 1.

Table 1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
SDG Index	31	.0	.8	.622	.1432	-2.764	.421	11.619	.821
X1-CO2Saved	31	.00	14.60	11.78	3.03	-2.347	.421	7.194	.821
X2-Project Cost	31	17	1500	382.51	468.690	1.560	.421	1.095	.821
X3-Employment	31	.00	2.38	1.99	.40	-4.362	.421	21.995	.821
X4-Productivity	31	0	128	60.16	35.610	-.015	.421	-.843	.821
Valid N (list wise)	31								

Source: Researcher, (2023)

The dependent variable, the SDG Index, measured the extent to which each project successfully implemented SDG goals, with values ranging from 0 to 1, where 1 indicated complete implementation. Based on the descriptive statistics, the mean SDG Index score across the 31 projects was approximately 0.622, suggesting that, on average, these projects had made significant progress towards implementing SDG goals. The standard deviation of 0.1432 indicated some variability in the extent of SDG goal attainment across the projects. The negative skewness (-2.764) and kurtosis (11.619) values suggested that the data was skewed to the left and had a leptokurtic distribution, indicating that a few projects might have had very high levels of SDG goal implementation.

This main independent variable was the pro-environmental impact of the projects, measured by the tons of carbon dioxide emissions saved or expected to be saved at the end of each project, with the data represented in logarithmic form. The descriptive statistics showed that the mean of the logarithm of carbon dioxide emissions saved was approximately 11.776. The relatively high standard deviation (3.034) indicated substantial variability in the projected carbon dioxide emissions savings across the projects. The negative skewness (-2.347) suggested a left-skewed distribution, and the kurtosis (7.194) indicated a moderately leptokurtic distribution, suggesting that some projects might had significantly larger emissions savings than others.
The other variable was the expected project costs, represented in million dollars. The mean project cost was approximately 382.51 million dollars, with a relatively high standard deviation of 468.690 million dollars, indicating considerable variation in project costs among the sampled projects. The positive skewness (1.560) indicated that the data was skewed to the right, suggesting that there might be a few projects with exceptionally high costs. The kurtosis (1.095) suggested a mesokurtic distribution, implying that the distribution was relatively normal.

Employment variable on the other hand examined the direct employment generated by the projects, with data represented in logarithmic form. The mean logarithm of direct employment was approximately 1.992, indicating that, on average, projects generated nearly 2 direct jobs. The standard deviation of 0.399 suggested relatively low variability in the number of direct jobs across the projects. However, the highly negative skewness (-4.362) indicated a severe left skew, suggesting that most projects generated a small number of direct jobs, but a few projects might have created significantly more jobs. The kurtosis (21.995) suggested a highly leptokurtic distribution with heavy tails.

Productivity on the other hand assessed project productivity by measuring the ratio of total capacity achieved by the project over the total capacity expected. The mean productivity was approximately 60.16, indicating that, on average, projects achieved about 60% of their expected capacity. The standard deviation of 35.610 suggested some variability in project productivity. The skewness was slightly negative (-0.015), indicating a near-normal distribution, and the kurtosis (-0.843) suggested a platykurtic distribution, implying that the data had lighter tails and was less peaked than a normal distribution.

Diagnostic Tests

Diagnostic tests were undertaken to determine whether the data collected for each study variable was in the format and the manner in which it would not lead to undertaking spurious regressions. This meant that the diagnostic tests helped to understand the treatment that could be accorded in the situation that the data failed in a certain test.

Normality test was undertaken to determine whether data was distributed in a way that it formed a normal curve. The test is an essential step in statistical analysis to determine whether a dataset follows a normal distribution. The Shapiro-Wilk test was used to assess the normality of the data. The findings have been summarized in table 2.

Table 2: Normality Test

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SDG Index	.211	31	.001	.749	31	.000
X1-CO2Saved	.207	31	.002	.753	31	.000
X2-Project Cost	.297	31	.000	.718	31	.000
X3-Employment	.344	31	.000	.520	31	.000
X4-Productivity	.114	31	.200*	.966	31	.419

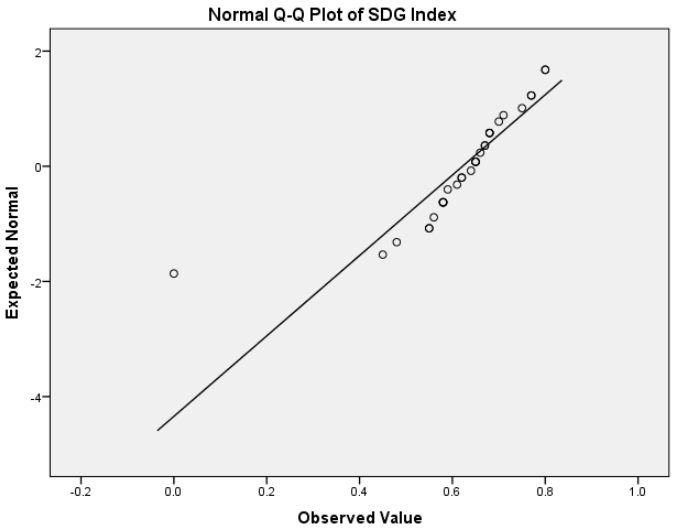
*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Source: Researcher, (2023)

The findings indicated in table 2 show that all the variables had p-value of Shapiro-Wilk test being less than 0.05 apart from Productivity which had a p-value of 0.419 that indicated that it was normally distributed. The other variables indicated that they were not normally distributed, and alternative means and analysis that did not require normality assumption could be used. However, transformation of these variable was also an option or standardization of these variables for parametric research.

Linearity test was undertaken by using linear plots, where Normal Q-Q plots that followed the diagonal line indicated that data was linear.

Figure 2: Normal Q-Q Graph



The Durbin-Watson test is a statistical tool used to detect autocorrelation, which is when the residuals (the differences between observed and predicted values) in a regression analysis show a pattern of correlation with each other. The test yields a Durbin-Watson statistic (DW), which ranges from 0 to 4. A DW value below 2 indicates positive autocorrelation, where high residuals tend to be followed by high residuals, while a DW value above 2 suggests negative autocorrelation, where high residuals are followed by low residuals. When DW is close to 2, it indicates no significant autocorrelation, implying that the residuals are independent.

Table 3: DW Test Table

Model	Durbin-Watson
1	2.106

Source: Researcher (2023)

The table 3 indicates that the Durbin-Watson (DW) score of 2.106, though slightly above 2, is still close to the ideal value of 2. This suggests that while there might be some positive autocorrelation in the residuals of the regression model, it is not significant enough to cause major concerns.

Variance Inflation Factor (VIF) values were calculated to assess the presence of multicollinearity among the independent variables. The VIF values indicate the degree of correlation between each independent variable and the others. Generally, VIF values below 10 are considered acceptable, as they suggest that the independent variables are relatively independent of each other.

Table 4: Multi-collinearity Table

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	X1-CO2Saved	.466	2.145
	X2-Project Cost	.934	1.071
	X3-Employment	.407	2.456
	X4-Productivity	.872	1.147

Source: Researcher (2023)

As indicated in table 4 the VIF values for the independent variables were all below 3, with the highest being 2.456 for X3-Employment. These values suggested a low to moderate level of multicollinearity among the variables, indicating that they were reasonably independent of each other. This was a positive finding, as it implied that the regression model could effectively assess the individual impacts of these variables on the dependent variable, the SDG Index, without being significantly affected by multicollinearity-induced instability. Researchers could therefore have confidence in interpreting the coefficients of these variables and their contributions to the model's predictive power.

Correlation Analysis

Correlation analysis is a statistical technique used to assess the strength and direction of relationships between two or more variables. It helps researchers understand how changes in one variable are associated with changes in another. In interpreting correlation results, the correlation coefficient, typically expressed as a value between -1 and 1, provides critical information. A positive correlation (closer to 1) suggests that as one variable increases, the other tends to increase as well, while a negative correlation (closer to -1) implies that as one variable increases, the other tends to decrease. A correlation near zero suggests little to no linear relationship. Furthermore, the significance level (p-value) assesses whether the observed correlation is statistically significant, indicating whether the relationship is likely to be due to chance. Correlation analysis however, does not imply causations and interpretation of the findings should be keenly undertaken. Table 5 indicates the correlation analysis of this study.

Table 5: Correlations Analysis

Correlations

		Zscore: SDG Index	Zscore: X1-CO2Saved	Zscore: X2-Project Cost	Zscore: X3-Employment	X4-Productivity
Zscore: SDG Index		1				
		31				
Zscore: X1-CO2Saved		.696**	1			
		.000				
		31	31			
Zscore: X2-Project Cost		-.071	-.105	1		
		.704	.576			
		31	31	31		
Zscore: X3-Employment		.834**	.717**	-.227	1	
		.000	.000	.218		
		31	31	31	31	
X4-Productivity		.370*	.107	-.005	.308	1
		.041	.566	.978	.091	
	N	31	31	31	31	31

Source: Researcher (2023)

The table 5, on the analysis of the relationships between various variables, several notable patterns emerge:

The SDG Index exhibits a robust and statistically significant positive correlation with both **X1-CO2 Saved** (r = 0.696, p =0.000) and **X3-Employment** (r = 0.834, p =0.000). This implies a strong and positive association between the SDG Index and the amount of CO2 emissions saved, as well as the number of direct jobs generated. These findings underscore the importance of environmentally sustainable projects and job creation in driving progress toward the Sustainable Development Goals (SDGs). The SDG Index shows only a positive but relatively weaker correlation with **X4-Productivity** (r = 0.370, p = 0.041) though still significant because p<0.05. This suggests that while there is a positive relationship between the SDG Index and project productivity, it is not as strong as the correlations observed with CO2 savings and employment.

Interestingly, there is a weak and statistically insignificant negative correlation between the SDG Index and **X2-Project Cost** (r = -0.071, p = 0.704). This implies that there is a slight negative relationship between the SDG Index and project cost, but it is not strong enough to be considered statistically significant.

In terms of **X1-CO2 Saved** it exhibits an insignificant correlation between CO2 savings and **X2-Project Cost** (r = -0.105, p = 0.576), suggesting that project cost does not significantly impact the amount of CO2 emissions saved. Additionally, **X1-CO2 Saved** shows a positive and strong correlation with **X3-Employment** (r = 0.717, p=0.000), indicating that while there is a positive relationship between CO2 savings and the number of direct jobs generated, it is also extremely a strong association. Similarly, the correlation between CO2 savings and **X4-Productivity** is weak and not statistically significant (r = 0.107, p = 0.566).

As for the **X2-Project Cost** it demonstrates a negative, albeit not statistically significant, correlation between project cost and **X3-Employment** (r = -0.227, p = 0.218), indicating that higher project costs may be associated with fewer direct jobs generated. The correlation between project cost and **X4-Productivity** is also not statistically significant (r = -0.005, p = 0.978).

Lastly **X3-Employment**, reveals a positive weak correlation with **X4-Productivity** (r = 0.308, p = 0.091), implying a relatively weaker association between employment and project productivity.

In summary, the findings indicate that the SDG Index, CO2 savings, employment and productivity are positively and significantly associated, suggesting that successful implementation of SDG goals is linked to higher CO2 savings, more jobs generated and more provision of goods and services. However, there is no strong evidence of a significant relationship between project cost and the SDG goal implementation in this dataset possibly suggesting that project cost saving has no relationship with carbon emissions. The interrelationships with each other are such that CO2 savings and employment are positive and significant meaning that low carbon emissions create more jobs. Additionally, there is a weak positive relationship between CO2 and productivity meaning that an increase in goods and services produced does increase carbon emissions. that efficiency in project implementation leads to. Project cost and CO2 have a weak negative association inferring that efficiency in project implementation reduces carbon emissions though not significantly. Essentially, project cost is insignificantly and negatively associated with both employment and productivity with a possible explanation being that wastage creates more jobs production of less goods and services is less costly. Employment is insignificantly positively associated with productivity the inference being that creation of more jobs calls for an increase in the production of more goods and services .

Regression Analysis

Regression analysis for the study was undertaken to determine the relationships between the impact of pro-environment economic projects and implementation of sustainable development goal. The study relied on the regression models provided as follow:
$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \varepsilon$

Regression Summary

Table 6: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.863[a]	.745	.706	.54233

Source: Researcher, (2023)

The model summary provided crucial insights into the effectiveness of the regression model in explaining the variability in the dependent variable, SDG Index, based on the contributions of the independent variables. The value of R is approximately 0.863a, which indicates a strong positive linear relationship between the independent variables and the SDG Index. There is a substantial association between the predictors (independent variables) and the SDG Index. The R-squared value (R Square) was a key indicator, and in this case, was estimated to be 0.745, which meant that approximately 74.5% of the variance in the SDG Index could be explained by the combination of independent variables in the model. This suggested that the selected independent variables which were pro-environmental impact of projects, project cost, employment and project productivity - collectively had a substantial influence on the implementation of sustainable development goals in Kenya as only 25.5% was explained by factors not included in the model.

The adjusted R-squared value (Adjusted R Square) is 0.706, which is slightly lower than the R-squared but still a strong indicator. It considers the number of predictors in the model and adjusts for potential over fitting. This value indicates that even after accounting for the complexity of the model, approximately 70.6% of the variance in the SDG Index remains explained by the selected variables. The standard error of the estimate, 0.54233, represents the average error in predicting the SDG Index. In sum, the model's high R-squared and adjusted R-squared values suggest that the combination of pro-environmental impact, project cost, employment generation, and project productivity is a strong predictor of the successful implementation of sustainable development goals in Kenya, with relatively low prediction error.

Table 7: ANOVA TABLE

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22.353	4	5.588	19.000	.000[b]
	Residual	7.647	26	.294		
	Total	30.000	30			

Source: Researcher (2023)

The ANOVA table provided important information about the overall statistical significance of the regression model in explaining the variance in the dependent variable, SDG Index, using the selected independent variables. The "Regression" row revealed that the model collectively explained a significant amount of variance, with a sum of squares of 22.353 and an associated F-statistic of 19.000. The extremely low p-value (Sig. = .000) further confirmed the significance of the model. This means that the combination of independent variables, including pro-environmental impact, project cost, direct employment, and project productivity, had a substantial and statistically significant impact on predicting the SDG Index in Kenya.
Conversely, the "Residual" row indicated the unexplained variance or error in the model, with a sum of squares of 7.647. The "Total" row represents the total variance in the SDG Index. Collectively, these values contributed to the understanding that the regression model was effective in explaining a significant portion of the variation in the SDG Index while maintaining a relatively low level of unexplained variance. This ANOVA analysis underscored the statistical significance of the model and suggested that the selected independent variables were strong predictors of the successful implementation of sustainable development goals in Kenya.

Regression Coefficients

Table 8: Coefficients Table

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.246	.204		-1.206	.239
	Zscore: X1-CO2 Saved	.224	.145	.224	1.541	.135
	Zscore: X2-Project Cost	.101	.102	.101	.987	.333
	Zscore: X3-Employment	.651	.155	.651	4.198	.000
	X4-Productivity	.004	.003	.146	1.372	.182

a. Dependent Variable: Zscore: SDG Index

Source: Researcher, (2023)

The coefficients table (Table 4.8) provides insights into the relationship between the dependent variable, SDG Index, and the independent variables in the regression model. Here's a discussion of the coefficients:

The Constant Term of (-0.246) represents the expected SDG Index when all independent variables are zero. An SDG Index of approximately -0.246 is expected when all predictors are at their reference points. This constant is not statistically significant ($p = 0.239$). The Zscore which is X1-CO2 Saved has (Coefficient: 0.224, $p = 0.135$): This coefficient indicates that there is a positive relationship between CO2 emissions saved and the SDG Index, but it is not statistically significant ($p > 0.05$). For every one-unit increase in standardized CO2 savings, the SDG Index is expected to increase by approximately 0.224 units, but this relationship is not considered significant at the 0.05 significance level.

The Zscore of X2-Project Cost reveals (Coefficient: 0.101, $p = 0.333$): The coefficient for Project Cost suggests a positive relationship with the SDG Index, but it is not statistically significant ($p > 0.05$) as one-unit increase in standardized project cost leads to 0.101 increase in standardized SDG index. This means that changes in project cost are not strongly associated with changes in the SDG Index. The Zscore of X3-Employment settles at (Coefficient: 0.651, $p = 0.000$): Among the independent variables, Employment (X3) stands out as the most influential predictor. With a coefficient of 0.651 and a highly significant p-value ($p = 0.000$), it indicates a strong positive relationship. For every one-unit increase in standardized direct employment generated by projects, there is an expected increase of 0.651 units in the standardized SDG Index. This implies that employment generation significantly promotes the successful implementation of sustainable development goals in Kenya.

The X4-Productivity has (Coefficient: 0.004, $p = 0.182$): The coefficient for Productivity suggests a positive but weak relationship with the SDG Index, and it is not statistically significant ($p > 0.05$). This means that changes in project productivity doesn't significantly affect changes in the SDG Index.

In summary, the findings suggest that among the independent variables, X3-Employment has a significant and positive impact on the SDG Index, indicating that employment generation plays a crucial role in achieving sustainable development goals. However, X1-CO2 Saved, X2-Project Cost, and X4-Productivity do not demonstrate statistically significant relationships with the SDG implementation in this dataset. These results emphasize the importance of employment generation in promoting sustainable development goals in Kenya, while pro-environmental, project cost, and project productivity do not show strong associations with SDG achievement in this analysis.

Discussions of the findings are a pointer to the following about the key insights into the factors influencing the successful implementation of sustainable development goals (SDGs) in Kenya among pro-environmental projects. The correlation analysis demonstrated that the number of direct jobs generated by projects had a strong positive association with implementation of SDG goals, signifying that as direct employment increased, there was a corresponding increase in the achievement of SDG goals. This finding suggested that employment generation played a crucial role in advancing sustainable development efforts in Kenya. Furthermore, the regression analysis provided a comprehensive understanding of how multiple factors collectively contributed to implementation of SDG goals. The model explained approximately 74.5% of the variance in the SDG Index, emphasizing the significance of the selected independent variables. Among these variables, Employment remained the most influential predictor, with a substantial coefficient and high statistical significance. This reaffirmed the pivotal role of employment generation in driving SDG success among projects in the Kenyan context. However, the study also revealed that other variables, such as pro-environmental impact, project cost, and project productivity, did not exhibit significant relationships with the SDG Index. These variables, while relevant, did not emerge as statistically significant factors in this specific analysis.

In summary, the study's findings underscored the importance of employment generation as a key driver of sustainable development in Kenya. While other factors like environmental impact, project cost, and productivity remained relevant considerations, their influence on SDG attainment in this study did not reach statistical significance. This information could guide policymakers and stakeholders in directing their efforts towards strategies that prioritize job creation as a means to advance sustainable development goals in the country. Among the studies reviewed, several supported the key findings of the current study while others had different research focuses. Those studies in alignment with the current research emphasized the significance of pro-environmental initiatives and sustainable practices in contributing to sustainable development goals. For instance, Islam and Managi's (2019) study on natural capital accounting in India demonstrated how environmental sustainability is crucial for reaching SDGs, echoing the broader aim of sustainable development. Similarly, Chege and Wang's (2020) examination of environmental sustainability practices within Kenyan SMEs underscored how such practices could positively impact both business performance and, implicitly, sustainable development.

Conversely, studies like Trzcieliska and Kaps (2021), Jakubczak *et al.,* (2021), Yusoff *et al.,* (2020), Atieno and Njoroge (2016), and Hinson, Lensink, and Mueller (2019) had different research focuses. For instance, Trzcieliska and Kaps explored managerial pro-environmental behaviour in Polish enterprises, Jakubczak *et al.,* delved into security concerns related to sustainable development, Yusoff *et al.,* concentrated on students' pro-environmental behaviour in a Malaysian educational context, Atieno and Njoroge examined the concept of ecotourism in Kenya, and Hinson, Lensink, and Mueller studied the role of FinTech in agribusiness transformation in Ghana. These studies, while valuable in their own right, did not directly address the impact of pro-environmental economic projects on the implementation of sustainable development goals in Kenya, which was the central focus of the study.

CONCLUSIONS

This study delved into the impact of pro-environmental economic projects on the implementation of Sustainable Development Goals (SDGs) in Kenya. It explored the nexus between economic initiatives with environmental objectives and the broader sustainable development agenda in a developing country context. The comprehensive analysis of various factors yielded significant insights. Among the factors examined, direct employment generation emerged as the most influential factor positively associated with SDG achievement. This finding underscores the critical role of job creation in advancing both environmental sustainability and socio-economic progress, aligning with the global commitment to achieving sustainable development. Surprisingly, factors related to pro-environmental impact, such as CO2 savings, did not exhibit statistically significant relationships with SDG implementation in this study. This suggests that while pro-environmental economic projects are essential for ecological well-being, their direct impact on achieving SDGs may vary. This highlights the importance of a multifaceted approach to sustainable development, where

environmental and economic considerations should be harmonized to maximize positive outcomes. Additionally, project cost and productivity were not found to be statistically significant predictors of SDG implementation. These results emphasize the complexity of the relationship between economic factors and sustainable development goals, suggesting that cost-efficiency and productivity might not always directly translate into enhanced SDG outcomes.

This research significantly contributes to the understanding of how pro-environmental economic initiatives can shape progress toward SDGs in Kenya. The prominence of direct employment generation highlights its pivotal role in achieving a sustainable future. However, the nuanced findings also underscore the need for a holistic and context-specific approach to sustainable development. Policymakers and stakeholders can draw valuable insights from this study to align economic activities with sustainable development objectives effectively, recognizing the multifaceted nature of the SDG agenda. This study shed light on the intricate relationship between pro-environmental economic projects and the implementation of Sustainable Development Goals (SDGs) in Kenya. The findings underscored the pivotal role of direct employment generation as a significant driver of SDG achievement in the Kenyan context. The positive correlation between employment opportunities and the successful realization of SDGs emphasized the dual benefits of such initiatives, fostering economic growth while simultaneously advancing sustainability objectives.

While direct employment emerged as a key influencer, this study also highlighted the nature of sustainable development. Notably, pro-environmental impact, project cost, and project productivity did not exhibit statistically significant relationships with SDG implementation. This underscored the complexity of sustainable development and suggested that a multifaceted approach, addressing various aspects of economic and environmental sustainability, was crucial for comprehensive progress toward SDGs. In essence, this research offered valuable insights for policymakers, businesses, and development practitioners, emphasizing the importance of targeted job creation initiatives within the broader framework of sustainable development in Kenya and potentially other developing economies facing similar challenges.

The findings offered several vital recommendations for both policy and practice in Kenya's pursuit of Sustainable Development Goals (SDGs). The study underscored the paramount importance of fostering direct employment through pro-environmental economic projects. Policymakers ought to prioritize and support initiatives that created job opportunities, recognizing that employment generation not only bolstered the nation's economic health but also significantly contributed to SDG success. Policies encouraging businesses to invest in such projects could serve as a cornerstone in Kenya's sustainable development agenda.

However, the study also cautioned against a one-dimensional approach. While direct employment emerged as a strong influencer, other facets of sustainability, including pro-environmental impact, project cost, and productivity, should not be overlooked. A holistic strategy that encompasses various dimensions of sustainability was essential. This multifaceted approach ensured that pro-environmental initiatives aligned with a broader sustainability framework, enabling Kenya to tackle environmental, social, and economic challenges simultaneously.

Furthermore, policymakers and practitioners should consider the importance of environmental education and awareness programs. Promoting a culture of environmental responsibility among businesses and the general public could enhance the effectiveness of pro-environmental projects. Additionally, governments could incentivize businesses to invest in sustainable practices through tax breaks, subsidies, or grants, catalysing a shift towards a more environmentally conscious economy. To sustain progress, continuous monitoring and evaluation of these initiatives are crucial. By staying data-driven and adaptive, Kenya could make informed decisions, allocate resources effectively, and maintain its course towards a more sustainable and prosperous future, aligning with the global SDG agenda.

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