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RENEWABLE ENERGY INVESTMENT AND ECONOMIC DEVELOPMENT IN BAIDOA DISTRICT, SOUTHWEST STATE, SOMALIA

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ABSTRACT

Cost-effective, reliable energy sources remain critical in spurring production and overall economic growth, especially in developing countries. However, inadequate investments in the renewable energy sector continue to hinder the desired economic development. This study seeks to establish the effect of renewable energy investment on economic development in Baidoa District, Southwest State, Somalia. Descriptive cross-sectional design employed techniques (Quantitative and Qualitative Methods) and targeted 10,656 households from 10 divisions in Baidoa District, Southwest State, Somalia. A structured random sampling method was used. The study also used the systematic sampling method to determine the starting points of sampling and the sequence in each of the 10 subunit villages. The data collected were analysed through descriptive analysis that included frequency, percentage, mean, and standard deviation, while the Inferential Statistical Method included linear regression analysis. The Cochran sample determination formula was used for calculating sample sizes of 423 household heads. The study also established that there is a significant relationship between solar energy investment and economic development in Baidoa District. Southwest State. Solar remains the most used renewable energy with biogas mostly used in the villages. There is increased business growth due to the availability of solar energy that is secure, cost-effective and reliable and the level of investment in renewable energy significantly affect the economic development in Baidoa District, State-Somalia. The study recommended that there is a need for increased renewable energy investment and consumption in different renewable energy sources in order to drive GDP growth.Further, there is a need to invest in renewable energy in order to ensure that there are cost-effective and reliable sources which are critical in creating jobs, lowering energy costs to increase production at both micro and macro level, fostering innovation, and reducing reliance on expensive imported fuels that are not only costly but are also unreliable.

Key Words: *Renewable Energy Investment, Economic Growth, Levels of Economic Development, GDP, Employment Rate, Energy Source*

Renewable Energy Investment and Economic Development in Baidoa District, Southwest State, Somalia

1.1 Background of the Study

The importance of economic development lies in its contribution to the general prosperity of the population. Economic growth is essential as it enables the community to access a greater quantity of goods and services, thereby contributing to an enhanced overall level of goods and services, which results in a tangible improvement in living standards (Boldeanu and Constantinescu, 2020). Economic growth serves as a fundamental element in the well-being and prosperity of a nation's citizens (Scutaru, 2022). While there are other factors that affect economic growth, cost-effective, reliable energy sources remain critical in spurring production and overall economic growth, especially in developing countries. However, inadequate investments in the renewable energy sector continue to hinder the desired economic development (Situma, Nelson and Nyenyi, 2024). Additionally, the inability to exhaustively explore the potential opportunities for the adoption of renewable energy to address constant energy deficits has negatively impacted sustainable economic development across the continent.

Many countries in Southern America and some parts of Asia that include Yemen, Afghanistan, Myanmar, Tajikistan and Nepal remain among the poorest globally (Baker, 2023). In Africa, the poverty rate is estimated at above 38.9 % in Nigeria, living below the poverty line in the global's second-largest poor population after India. Malawi posted a poverty rate of 70 percent with a population living on less than $2.15 a day (World Bank Group, 2025) while Kenya registered a poverty rate of 43.8%. The country with the highest poverty rate in Africa is South Sudan, with an estimated 82.3% of its population living in extreme poverty, followed by the Democratic Republic of Congo at 85.3% and Equatorial Guinea at 76.8%(Sudanese American Physicians Association,2025). Rwanda has the among the lowest employment rate in the East Africa region with only 27.4% of the population living in poverty in 2023/24, indicating a drop from 39.8% in 2017, although the country with the lowest poverty rate is Morrocco with a poverty rate of 3.6% (National Institute of Statistics of Rwanda, 2025).

In terms of GDP, Malawi is facing the lowest GDP growth, which is projected to reach only 2.4% in 2026 amid impending efforts to reduce poverty in Malawi (Sichoongwe, 2023). In the second-largest economy in the East African community, an estimated 34% of its population live in poverty with no access to necessities of life, while in Uganda, the unemployment rate for people aged 14–30 stands at over 20% (Julius and Nancy, 2024; Gupta,2021). Kenya, on the other hand, estimates an economic growth of 10% annually (Chemwok, Siele and Saina, 2023). However, evidence indicated that GDP growth in Kenya decelerated to an estimated 4.5% in 2024, while Somalia's GDP is currently at 4.0% as the trade gap widens to 62.1% of GDP in 2024, from 60.8% in 2023 (World Bank Group,2025).

Cost-effective, reliable energy sources remain critical in spurring production and overall economic growth, especially in developing countries. However, inadequate investments in the renewable energy sector continue to hinder the desired economic development (Situma, Nelson and Nyenyi, 2024). Evidence indicates a relationship between renewable energy investment and economic growth as Sub-Saharan African countries seek to double their investment in renewable energy capacity to more than 60%, indicating a potential for economic growth (Climate Investment Fund, 2025). Rwanda, too, seeks to increase its renewable energy source to 60% by 2030 as Kenya seeks to provide cost-effective energy, enhance energy security, create jobs, attract foreign investment, and improve rural development and support small and medium investment through increased renewable energy investment (Situma, Nyenyi and Obange,2024). Investment in renewable energy, therefore, remains critical in achieving the desired economic development in Baidoa, where seven out of 10 people's population, just like the rest of the country, survive on less than \$1.90 per day. Increased investment in renewable energy is critical in spurring economic growth as the country faces a 4.4% decline in real per capital income.

1.2 Statement of the Problem

Baidoa District continues to register high levels of unemployment, poverty estimated at 70%, food insecurity, and inadequate infrastructure, with seven out of 10 population surviving on less than \$1.90 per day as capital income declined by 4.4% (Tonnarell and Maddock,2023). Affordable, reliable and sustainable power supply remains critical to spurring economic development in the district. While increased investment in renewable energy can significantly impact economic development in the Baidoa district, the current public investment in renewable energy remains low and inadequate to spur the desired economic growth (Ahmed, 2024). Therefore, establishing the levels of renewable energy investment and its effect on economic development is important to advise governments, development partners and energy sector players on appropriate strategies and policies.

1.3 Objectives of the Study

1. Levels of renewable energy investment in Baidoa District, Southwest State, Somalia
2. The relationship between renewable energy investment and economic development in Baidoa District, Southwest State, Somalia.

1.4 Theory of Planned Behavior

The study developed by Ajzen in 1985 posits that an individual's assessment of their own ability and the perceived ease or difficulty of performing the behaviour, in this case, the ease of investment in the installation and meeting the costs of a renewable energy system. The theory relates to the study, given that the positive attitude toward solar energy makes someone more likely to intend to install solar panels. In relation to the subjective norms, which include perceived social pressure to perform or not perform the behaviour, development partners, development partners such as NGOs and government support for renewable energy can influence someone's intention to adopt it.

1.5 Literature Review

1.5.1 Levels of Renewable Energy Investment

Renewable energy investment refers to the allocation of financial resources towards projects that harness energy from naturally replenishing sources (Ariff, 2024). Letcher (2020) also defined renewable energy investment as putting resources into the development of energy that does not cause detrimental environmental issues such as global warming and climate change. These sources, unlike fossil fuels, do not deplete over time, therefore offering a path to long-term sustainability. Levels of investment in renewable energy vary from one country to another, although Europe, the United States of America and some parts of Asia have achieved high levels of investment (Ajide and Usman, 2022). The United States remains one of the resource-rich countries globally with abundant renewable energy resources that, if well tapped and invested, is 100 times that of the nation’s annual electricity needs, while renewable energy currently accounts for 24.5% of the EU's electricity use and aims to reach 42.5% by 2030, with wind and hydropower being the largest contributors (US Department of Energy, 2022; Friedman, 2025).

In Africa, the targeted investments in renewable energy and harnessing have only utilised 25 % of Africa's renewable energy potential (Temidayo, Bamisile and Cai, 2025). Nigeria, though it is a leading economy on the continent, solar only accounts for 0.3 % of energy use in the country, though higher in South Africa, more than 8 percent of South Africa's electricity currently comes from renewable sources, while Uganda is yet to tap into its renewable energy despite having huge sources of renewable energy that include bioenergy, through biomass and biogas, water/hydro, solar, geothermal and wind energy potential, (Climate Investment Fund, 2025; Giz, 2022). Rwanda, on the other hand, through a new sustainable energy policy that targets 60% renewable energy implementation by 2030, is actively seeking investments in renewable energy for reliable and affordable energy source necessary to spur economic development. Kenya remains the highest regional investor in renewable energy with the current sources representing 90% of Kenya's electricity generation and an ambitious goal of attaining 100% clean energy by 2030(Omenda, Ofwona and Mangi,2025). While Somalia has potential for renewable energy, particularly in solar and wind power, the country is yet to significantly tap into the potential of renewable energy even with the current National Development Plan and international support that is aimed at encouraging investment in renewable energy (Power Africa, 2024). In addition to the above, regions such as Baidoa, though it has the potential for renewable, the levels of investment are still very low(UNSOS,2020).

1.5.2 Relationship between Renewable Energy Investment and Economic Development

Empirical evidence indicates a relationship between renewable energy investment and economic growth. In Brazil, Romanello (2022) established that the presence of renewable energy power plants is beneficial only in terms of GDP per capita growth, while in Canada, Anwar, Siddique and Sharif (2021) also established a significant effect on its economic development that closed at 2.6%in the fourth quarter of 2024 energy while Akter (2024) also revealed a significant co-integration among renewable energy consumption, unemployment and GDP growth in Bangladesh, India, Pakistan and Sri Lanka.

In Africa, Aidoo, Khobai and Kleynhans (2023) revealed a significant relationship between renewable energy and economic growth in the Southern Africa power pool. Yangailo (2025) established that renewable energy investment positively affected GDP growth and advised that there is need for a strategic investment in renewable energy, while in Tanzania, Okika, Musonda and Monko (2025) established that dynamic transition toward renewables did not only improve Tanzania's energy security, but it has also stimulated long-term economic development. Kenya's investment in renewable energy is the highest in the region and critical for its economic growth. Obange (2024) established a relationship between renewable energy consumption and economic growth in Kenya with a unit increase in total renewable energy consumption leading to a gross domestic product rise by 13,340 million dollars in the second year. Somalia is yet to fully explore the benefits associated with renewable energy investment. However, Somalia can improve energy security, reduce poverty, and lead regional sustainable development by using its renewable energy resources (Samatar, Mekhilef and Mokhlis, 2023).In relationship to this, Aidid (2024) also advised that Somalia must integrate renewable energy into its national development strategies.

1.6 Methodology

Descriptive cross-sectional design employed techniques (Quantitative and Qualitative Methods) and targeted 10,656 households from 10 divisions in Baidoa District, Southwest State, Somalia (UN-Habitat, 2020). The study used a stratified random sampling method that was used to select the households in Baidoa District. The study also used the systematic sampling method to determine the starting points of sampling and the sequence in each of the 10 subunit villages. The unit at the start point was picked, and then every kth unit was selected until the required sample size in each of the 10 administrative villages is reached. The Cochran sample determination formula was used for calculating sample sizes of 423 household heads that included a 10% to carter for non-responses. Data was collected through structured questionnaires. The data collected was analysed through descriptive analysis that included frequency, percentage, mean, and standard deviation, while the Inferential Statistical Method included linear regression analysis.

1.7 Results

Table 1: Response Rate

Category	Frequency	Percentage
Responded	348	82.3
Did not respond	75	17.7
Total	**423**	**100.0**

The study showed that out of the 423 respondents sampled for the study, 82.3% responded. The response rate was considered very adequate. Arora (2003), stated that a questionnaire-based study that produces above 65% response, is rated as a well-participated study.

Table 2: Level of Renewable energy investment

#	State of Renewable energy investment	N	Mean	Standard Deviation
1	Most of the investment in renewable energy is in Solar	348	4.31	1.079
2	You find more investment in biogas in the village	348	4.75	.830
3	The government is yet to invest optimally in wind energy	348	4.24	.935
4	There is high level of investment in renewable energy at individual level	348	2.78	1.105
5	There is massive investment in renewable energy in urban centers	348	2.91	1.033
6	Many businesses are pulling together resources for renewable energy investment	348	4.01	1.082
7	Individuals are investing in solar energy for their business operations	348	4.25	1.162
8	The initial cost of installation of solar energy is keeping people away from renewable energy investments	348	4.10	1.046

9	There is available financing from formal institution to support investment in clean energy sources	348	2.16	1.138
10	People are very poor to afford the initial fee required for installing renewable energy power systems	348	4.00	1.155
11	Generally, there is low investment in renewable energy	348	3.93	1.253
12	Local and International NGOs are supporting solar energy especially for small holder householders	348	3.48	1.197
13	The government has not done enough in renewable energy investment	348	4.15	.861

Most of the investment in renewable energy is in Solar (Mean=4.31; Std. Deviation=1.079)., more investment in biogas only found in the village (Mean=4.75; Std. Deviation=.830), the government is yet to invest optimally in wind energy (Mean=4.24; Std. Deviation=.935), there is high level of investment in renewable energy at individual level (Mean=2.28; Std. Deviation=1.105) and that there less investment in renewable energy in urban centers (Mean=2.91; Std. Deviation=1.033). The results also indicated that many businesses are pulling together resources for renewable energy investment (Mean=4.01; Std. Deviation=1.082) and that individuals are investing in solar energy for their business operations investment (Mean=4.25; Std. Deviation=1.162)

The results also indicated that the initial cost of installation of solar energy is keeping people away from renewable energy investments (Mean=4.10; Std. Deviation=1.046), there is available financing from formal institution to support investment in clean energy sources (Mean=2.16; Std. Deviation=1.138) and that people are very poor to afford the initial fee required for installing renewable energy power systems (Mean=4.00; Std. Deviation=1.155).The study also established that generally, there is low investment in renewable energy (Mean=3.93; Std. Deviation=1.253), local and International NGOs are supporting solar energy especially for small holder householders (Mean=3.48; Std. Deviation=1.197) and that the government has not done enough in renewable energy investment (Mean=4.15; Std. Deviation=.861).

Table 3: Effects of renewable energy Investment on Economic Development in Baidoa District

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.509[a]	.495	.488	.85575

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	26.565	3	8.855	12.092	.000[b]
	Residual	251.913	344	.732		
	Total	278.478	347			

a. Dependent Variable: Economic Development
b. Predictors: (Constant), Renewable energy Investment, Levels of investment in renewable energy

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	3.124	.303		10.315	.000
	Levels of investment in renewable energy	.674	.158	.641	-4.266	.000

The coefficient determination (R Squared) of .495 indicates that Levels of Renewable Energy Investment accounts for the 49.5% of the Economic Development in Baidoa District, State-Somalia. The remaining 50.5% is attributed to other factors other than Levels of Renewable Energy Investment in the district.

The Analysis of Variance (ANOVA) test was also used in the study to determine the statistical significance of the regression model. The results of the ANOVA test show a p-value of less than 0.05 (Sig=.000<.05), indicating that the model above is statistically significant in explaining the relationship between Levels of Renewable Energy Investment and variations in the Economic Development in Baidoa District, State-Somalia. The model was also statistically fit to test the link between Levels of Renewable Energy Investment and variations in the Economic Development in Baidoa District, State-Somalia (F=12.092; 3, 344).

Based on the coefficients in Table 3. above, the regression equation that is produced is:

$Y= 3.124+.674X1+.303$

The following is an interpretation of the equation above:

A change of. 674 in levels of investment in renewable energy will result into a unit change in the Economic Development in Baidoa District, Southwest, State-Somalia. Regression model (ß=3.124) is also statistically significant (sig=.000<.05), according to the results. Additionally, the results demonstrate a statistical significance of levels of investment in renewable energy (Sig=.000<.05).

Therefore, the results indicated that levels of renewable energy investment significantly affects the Economic Development in Baidoa District, State-Somalia. Further, levels of renewable energy investment account for 49.5% of variations in the Economic Development in Baidoa District, State-Somalia.

1.8 Discussion of findings

The study established a significant relationship between renewable energy investment and increased economic development in terms of creation of jobs, longer working hours and cheaper operational costs due to low cost of energy. These findings are consistent with earlier findings by Romanello (2022) that also established that the presence of renewable energy power plants is beneficial only in terms of GDP per capita growth and Anwar et al. (2021), which established a significant effect of renewable energy on economic development that closed at 2.6%in the fourth quarter of 2024 energy in Canada while another study by Rahman and The positive effect of renewable on economic development was further established by Yangailo (2025) which revealed that renewable energy investment positively affected GDP growth.

The significant importance of renewable energy investment was further highlighted by Ahmed et al. (2024) that renewable energy remains a viable option for an electricity source that can support economic development in the region and therefore remains an area that should be considered for increased investment both by the government and the private sector with Rwigema (2021) pointing out that displacing expensive and polluting diesel generators, renewable energy reduces operational costs for businesses and institutions while Situma et al. (2024) highlighting that investment in renewable energy is critical in impacting economic growth in Kenya by providing cost-effective energy, enhancing energy security, creating jobs, attracting foreign investment, and improving rural development and support small and medium investment.

The significance importance of renewable energy investment has also been stressed by Dirma, Neverauskienė and Tvaronavičienė (2024) that investment in renewable energy sources is inseparable from the sustainable development of the modern nations and society given that they have a huge impact on the country's economy, its growth rates, social and economic well-being, and ensuring technological development, security, and economic stability. Samašonok and Išoraitė (2023) further advise that investments in the use of renewable resources is seen as an ambitious opportunity that can help the sector grow and contribute to the exporting of energy to neighbouring countries that can earn revenue for the country. The increase in access to clean, affordable and reliable energy for the communities helps in the transition from diesel generators to renewables without having to invest in any of the infrastructure (UN, 2020).

1.9 Conclusion

There is a significant relationship between solar energy investment and economic development in Baidoa District. South Solar remains the most used renewable energy, with biogas mostly used in the villages. There is increased business growth due to the availability of solar energy that is providing secure, cost-effective and reliable, and the level of investment in renewable energy significantly affects the economic development in Baidoa District, State-Somalia.

1.10 Recommendation

The study recommended that there is need for increased renewable energy investment and consumption in different renewable energy sources in order to drive GDP growth. Moreover, there is need to invest in renewable energy in order to ensure that there is cost effective and reliable sources which is critical in creating jobs, lowering energy cost to increase production at both micro and macro level, fostering innovation, and reducing reliance on expensive imported fuels that are not only costly but are also unreliable.

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