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SDGS Indicators And Acceptability Of Sustainability Develoment Goals In Ssa Region[1]

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Abstract: *This study employed ARDL Bounds test regression analysis to explore how accepting sustainability development goal indicators will drive sustainability development goals (SDGs). Specifically, the relationship between SDG indicators and acceptance of SDGs (proxy with GDP PCI annual growth), and Granger causality test on direction among the variables is examined. The results show 86.74% of the SDG indicators explain acceptability of SDGs. The result's negative sign for adjustment coefficient revealed a long-run equilibrium exist among the variables at speed of adjustment of 97.3%. In the long-run, PUBDWS and HCE&NPISH have strong direct association with acceptability of SDGs. EIS have strong inverse relation with acceptability of SDGs. EGS and inflation have weak negative relation with acceptability of SDGs while GGFCE have weak direct association with acceptability of SDGs. In the short-run, HCE&NPISH have weak negative bearing with acceptability of SDGs while EGS have positively insignificant bearing with acceptability of SDGs. Notwithstanding, EIS have a strong direct impact with acceptability of SDGs. Only PUBDWS and EGS have bidirectional Granger causality. There is unidirectional flow from PUBDWS to acceptability of SDGs, HCE&NPISH, and GGFCE. Unidirectional flows from acceptability of SDGs to EGS, and GGFCE. Unidirectional flows from EIS to acceptability of SDGs, EGS, and GGFCE. Unidirectional flows from inflation to PUBDWS, and EGS; and from HCE&NPISH to EGS. In the long run in SSA, PUBDWS, HCE&NPISH and GGFCE should be strengthened for maximizing synergies and minimizing tradeoffs for SDGs. On the other hand, policy on EIS, EGS, and inflation should be reviewed as there is negative synergy and tradeoff is likely huge to SSA region. These suggestions will help to promote sustainable employment generation, build human capital, improve socioeconomic empowerment through technology, and boost EcG acceptable for SDGs.*

Keywords: SDGs indicators, Acceptability of SDGs, ARDL Bounds Test, SSA Region, Granger Causality

Abbreviation

EcG: Economic growth.
EGS: Exports of goods and services.
EIS: Employment in services.
GDPPCG: GDP per capita annual growth rate employed as proxy for acceptability of SDGs.
GGFCE: General government final consumption expenditure.
HCE&NPISH: Households and NPISHs[2] final consumption expenditure.
INFL: Inflation, consumer prices.
PUBDWS: People using at least basic drinking water services.
SD: Sustainable Development.
SDGs: Sustainability Development Goals
SSA: sub-Sahara Africa.

Introduction

The world is beset with various crises that threaten the very survival of humanity. Humanly, efforts and ways to prevent and minimize the crises are addressed holistically in the SDGs. In 2015, about 200 countries adopted the 2030 Agenda as part of Sustainable Development, launched by the United Nations (UN). The 2030 agenda is plotted to be implemented by all signatory countries as a plan of action for people, planet, and prosperity. It is an extension of the previous millennium development goals which guided global development efforts in the years 2000-2015, that is committed to eradicating poverty from the planet through a collective effort worldwide (Gallardo-Vázquez, Hourneaux, Da Silva, & Valdez-Juárez, 2021). The SDGs are a major focal point for international efforts to promote global welfare for the next decade (Fiorini & Hoekman, 2018; United Nations 2015). The SDGs span 17 broad goals, 169 targets, and more than 200 indicators, that businesses, governments, and civil society must do to achieve the SDGs, and they are modeled road map out of crisis.

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[2] Non-Profit Institutions Serving Households (NPISH) are sports clubs, unions, churches, charities helping the poor and similar bodies

Despite plausible perceived objectives of SDGs, their implementation and accomplishments are not consistent across countries due to the unique requirements of each country (Warchold, Pradhan & Kropp, 2021). For instance, in SSA's major challenges is inability to meet set developmental targets in the face of current financial and economic crisis. This has several bearings on the accomplishment of many of the relevant SDGs and probably negative effects on EcG, employment, poverty, and several other macroeconomic indicators of the SSA region. Furthermore, identifying and pursuing a strategy that maximizes synergies and minimizes trade-offs while promoting GDP growth and consequently SDGs is challenging for most UN member countries especially SSA, a developing region (Singh, Singh, Alam, & Agrawal, 2022). In pursuit of SDGs, progress toward one indicator should not hinder efforts to advance other indicators nor the SDGs otherwise, there will be conflict and their unacceptability. There is still lack of clarity on the variables crucial for driving SDGs, particularly in SSA region. The knowledge of the key drivers of SDGs will be a great step for formulating and implementing policies to foster, sustain and pursue acceptable SDGs. Again, identifying the key SDG indicators would be a giant breakthrough on the parts of policy makers and developing partners in mapping out SDG strategies.

This study, place emphasis on residents in SSA countries wellbeing and economic sustainability in line with 2030 agenda. The challenges that SD presents to society and to the planet is an ongoing issue for discussion. Sustainability suggests that the residents should be relatively contented and accept SDGs. Where they are not satisfied with the synergies and trade-offs from SDG indicators, there is the tendency that SDGs may be thwarted because they will compromise SDGs and, in an effort for the citizens to meet their expectation, they will identify and pursue alternative strategies which may be critical to the society and to SDGs. For instance, just as bunkering, tax evasion and avoidance, illicit business, crimes, etc., are likely to have adverse impact on the society. In this study, the net effect of citizens response that will impact on the society's wellbeing is proxy with GDPPCG. For the citizens to be enriched, each country should identify and place more emphasis on SDG indicators that will strongly impact their acceptability of SDGs in line with their specific contextual realities and unique characteristics (Tompa, Kiss, Maillot, Sarkadi, Temesi, Lakner, 2022; Borgnäs, 2017; Cook, Saviolidis, Davíðsdóttir, Jóhannsdóttir, Ólafsson, 2017). The main contributions of this study are, first, to provide a new perspective on the relationship between SDGs and SGD indicators in SSA region and, second, the suggestion of what can be considered acceptable for positive impacts to residents in SSA countries.

Literature Review

SDGs/GDP per capita growth (GDPPCG)

SDGs are viable models created for achieving all EcG without compromising our environment. The SDGs aimed at sustaining per capital EcG in accordance with national circumstances and, in particular, at least 7 per cent GDP growth per annum in the least developed countries; achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value-added and labor-intensive sectors; promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services; improving progressively, through 2030, global resource efficiency in consumption and production and endeavor to decouple EcG from environmental degradation, in accordance with 10-years framework of programs on sustainable consumption and production, with developed countries taking the lead; by 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value; etc. Achieving growth in the above-mentioned goals, no doubt will better a nations GDP per capita. In this study, GDP per capita growth is used as a proxy for accepting SDGs because SDGs cannot be met without growth, which tends to overshadow other issues.

GDP per capita is often considered as an indicator of a country's living standard, a measure for gauging the prosperity of nations, and it provides a basic measure of the value of output per person, which is an indirect indicator of per capita income. It is estimated as the sum of gross value added by all resident producers in the economy plus any product taxes (less subsidies) not included in the valuation of output, divided by mid-year population (World Bank Statistical Capacity Indicator, 2023). Sustained EcG increases average incomes and is strongly linked to poverty reduction. Growth in GDP and GDP per capita are considered broad measures of EcG. It helps to determine the economic strength and growth of the nation, which ultimately indicates the prosperity of the nation.

Figure 1 shows that GDP per capita in SSA region was less than USD 1,000 until 2004 and from then, it has been above USD 1,000 but less than USD 2,000 as of 2021. The highest it has attained is about USD 1,932 in 2004. As of 2021, it is about USD 1,633. GDP per capita in SSA region had increasing trend from 2001(USD 587) to 2008(USD 1,531, it plunged in 2009(USD 1,432), and increased thereafter to the highest so far in 2014(USD 1,932). Again, it dropped in 2020(USD 1,493) and as of 2021, it stood at USD 1,633.

In terms of GDPPCG (figure 2), in SSA, the worst decline in annual growth was recorded in 2020(-4.6%), next to it is 1993(-3.28%). The highest annual growth was recorded in 2004(3.74%) and next to it was 2007(3.27%). Negative GDP per capita annual growth were observed in 1990-1994, 1998-1999, 2012, 2016-2017, and 2019-2020. Growth was witnessed in 1995-1997, 2000-2011, 2013-2015, 2018, and 2021.

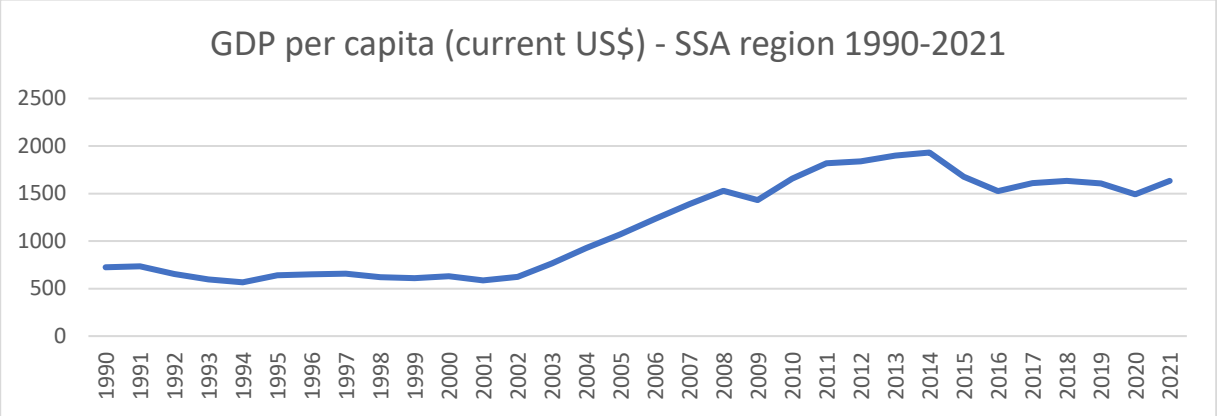

Figure 1: GDP per capita (current USD) – SSA region: 1990-2021.
Source: Researcher based on data extracted from World Bank statistical capacity indicator, 2023.

In a compare of GDP per capita annual growth for SSA, EU, and World, GDP per capita annual growth (figure 2) was lower than that of EU and World growth between 1990-2001 (except in 1996). Between 2001-2010, the annual growth was higher than what was obtained in EU and World, and noticeably between 2008-2010 during the economic meltdown of 2008. From 2015 till date (2021), the EU and World growth has been higher than that of SSA region (except in 2020 when it was higher than that of World.)

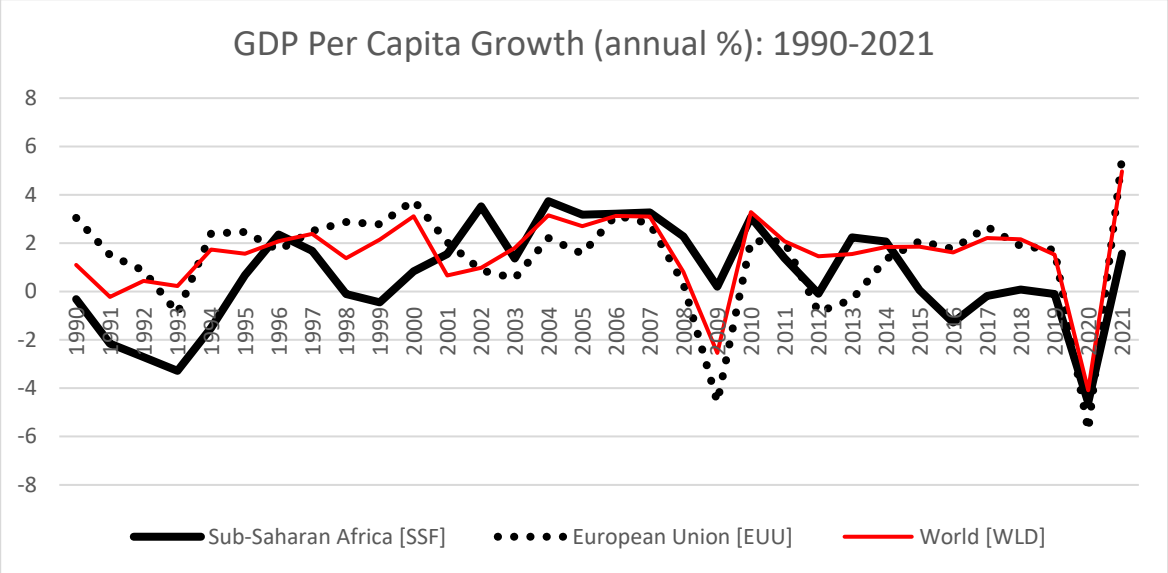

Figure 2: GDP per capita (annual %) – SSA, EU, & World region: 1990-2021.
Source: Researcher based on data extracted from World Bank statistical capacity indicator, 2023.

People using at least basic drinking water services (PUBDWS)

Water resources are embedded in all forms of development such as, in agriculture, industry, and energy generation, and in maintaining healthy ecosystems (United Nations, 2018). The diverse needs for water have its own challenges and there is growing consensus that the challenges can be met by adopting a more integrated approach to managing and allocating water resources, including the protection of ecosystems upon which societies and economies depend (United Nations, 2018). The criteria for a safely managed drinking water service are that an households must use an improved source that is, "accessible on premises, available when needed, and free from contamination." If the improved source does not meet the set criteria, and a round trip to collect water takes 30 minutes or less, then it is classified as a basic drinking water service. If otherwise, it is categorized as a limited service (Gallardo-Vázquez et al, 2021; Bain, Johnston, Mitis, Chatterley, & Slaymaker, 2018).

Further differentiations are the populations of those using unimproved sources, such as unprotected wells or springs, and those drinking surface water collected directly from a river, dam, lake, stream, or irrigation canal. SDG 6, Target 6.1. scheme has caused increased investment in drinking water services in the last two decades (WHO, UNICEF & World Bank, 2022). Nevertheless, there are wide geographical disparities on access to use safely managed drinking water, neither is the world even close to being on

track to meet the SDGs by 2030. The mean percentage of PUBDWS is least in SSA, it is about half what is obtainable in EU. Thus, SDG 6 Global Acceleration Framework calls on governments to make progress on governance, financing, capacity development, data and information and innovation for enhancing PUBDWS particularly in SSA region.

Having a safely managed drinking water is expected to impact positively on societies when it comes from accessible sources, people spend less time and effort physically collecting it: time is saved for other productive activities. The benefits also include reduced health care costs from averted premature mortality, and fewer interruptions in school attendance by children. Whereas global population using safely managed drinking water services has increased, yet many countries still lack even a basic level of service (Gallardo-Vázquez et al., 2021) nor will they fully realize the SDGs ambition to achieve 'universal' access 'for all' and to 'leave no one behind' (UNICEF & WHO, 2019). Gallardo-Vázquez et al. (2021) observed that eight out of ten people who lack even basic drinking water service live in rural areas, and about half of them live in LDCs.

In SSA, though access to basic drinking water has increased and a quarter of the current population has gained access to at least basic drinking water (UNICEF & WHO, 2019), the progress on SDG Target 6.1, and the additional acceleration needed to achieve universal by 2030, is threatened by ever-increasing impacts and uncertainty of several factors that may affect the acceptability or not of SDGs, they include: Climate change impact which cause increased concentration of pollutants in drinking water. It's a threat to both human health and entire ecosystems. Water scarcity and droughts is causing enormous stresses on communities, especially the most vulnerable. Additionally, flooding which disrupt supplies and devastating communities and damaging infrastructure and services. They lead to water contamination which cause water sources to become unsustainable for many millions, sea-level rise leading to freshwater salinization in coastal areas, and cause huge economic costs (WHO, UNICEF & World Bank, 2022).

Among the other factors that impinge on PUBDWS are hours spent walking long distances to fetch water; competing agricultural, industry, domestic use, and ecological water needs; competing financial priorities; monitoring and upkeep costs as it is not a one-time investment (WHO, UNICEF & World Bank, 2022). Additionally emerging threats to water quality are water-based diseases from contaminated drinking water that causes illness and death. The abilities to deliver water is further limited by urbanization and population growth of people living in informal communities and slums, while in rural areas, low quality services, waterpoint breakdown are a daily reality (WHO, UNICEF & World Bank, 2022). Increasing amounts of untreated wastewater are happening against the backdrop of climate change, which is playing havoc with the predictability of our most precious resource (United Nations, 2018). The above reviews indicates that PUBDWS has its pros and cons. Thus, the performance of greater percentage of those affected by any of these challenges may be truncated and so influence acceptance of SDGs

Households and NPISHs Final consumption expenditure

Private consumption has contributed primarily to GDP in virtually every economy across the world, and it is a key indicator of citizens' wellbeing. Approximately two thirds of the GDP is household consumption expenditure (HCE) (Tapsin & Hepsag, 2014). Economic literature acknowledged that household consumption drives economic activities, contributes greatly to aggregate demand, and eventually transmit to EcG, reduce unemployment and possibly spillover benefits of poverty reduction. In this respect, HCE have the tendency to raise GDP and economic development level, and consequently, GDP per capita growth giving its corresponding multiplier effect (Koyuncu & Ünal, 2020; Lie et al., 2018). Besides the households' direct consumption expenditures, expenditures made by nonprofit institutions serving households (NPISH) is also an effectual item that can affect economic value. For convenience, direct consumption expenditure and NPISH is combined and referred to as HCE&NPISH in this study.

Africa is one of the fastest-growing consumer markets in the world and while her HCE&NPISH has increased even faster than its GDP in recent years, her average annual GDP growth has consistently outpaced the global average. Increasing affluence, population growth, urbanization rates, and rapid spread of access to the internet and mobile phones, and emerging economies present exciting opportunities for expansion in consumption in Africa. However, despite recording some of the fastest EcG rates in the world over the past decade, income levels in SSA have not kept pace with global standard and household spending in the region has remained relatively stagnant (Signe, 2018).

It is a known fact that overall price levels in richer countries are higher than that obtained in poorer countries. Notwithstanding, items traded are relatively more expensive in poorer countries, this is in spite having lower income levels. In an earlier study, Nakamura et al (2016) showed that price levels of traded goods and services consumed by households are up to 31 per cent higher in SSA than in other low- and middle-income countries, relative to their income levels. A possible reason why traded goods and services are more expensive in SSA is that the consumers additionally, are paying for welfare benefits and subsidies they ought to have enjoy from government. Because the goods and services are more expensive in the poorer economies such as SSA that have lower income levels, there is the tendencies that burden of economic development and growth will fall on the consumers shoulder, and consequently inimical to SDGs. However, this phenomenon is nonlinear: price levels jump up as countries pass a certain threshold of GDP per capita. Additionally, one of the foremost challenges facing the short-term development of the consumer market in SSA is decline in global commodity prices and deepening inflation and recession. Thus, the relationship between HCE&NPISH and SDGs (proxy with GDP per capita) may not be a straight-jacket one because it is further affected by other factors.

Exports of goods and services (EGS)

The role of exports in sustainable development in any region economy cannot be underscored. Exporting is associated with static gains such as access to larger outside markets. It is an opportunity for exporters to exploit economies of scale in production. Thus, gaining access to wider external demand has the tendency to stimulate domestic output and PCI to exporters. Besides, exporting also attract dynamic gains such as efficient advancement from knowledge and technology spillover from exporting experiences association with consumers specific needs (Gbaale & Mutenyo, 2011). This is a positive knowledge externality from learning experience of exporters from rise in skills to upgrading the quality of products in line with what international consumers dictate (Gbaale & Mutenyo, 2011). The theoretical exposition of the relationship between exporting and EcG is premised on the assumption that exporting impact EcG when productivity, knowledge, and technological spillover lend to a vital synergy to endogenous growth.

Export of goods and services matter for the realization of the SDGs, not just because they are a potential source of foreign exchange revenue required to purchase capital goods, up-to-date knowledge and technology which are embedded in the capital imported goods and services from advanced countries, efficient allocation of resources, associated employment and household income, but also because realization of many of the SDGs is conditional on enhancing the performance of a range of specific services sectors in developing countries. The net impact is stimulating the recipient country's capacity to produce locally and consequently, EcG and increase in PCI. Hence, export stand to be a significant determinant of per capita real income growth; consistently positively related to growth. Specifically, most studies support positive relationship between export and EcG (Chia Yee Ee, 2016; Abu-Quarn & Abu-Bader, 2004). Notwithstanding, some studies on the relationship between trade and EcG in SSA are uncertain (Iyoha & Okim, 2017).

In spite the above mentioned probably benefits, some factors are likely to harm export performance in SSA. Amongst these factors are: narrow production and export base dominated by low-value product and mainly raw materials and primary commodities; high transaction cost and multiple tax challenges; tariff and non-tariff barriers to intra-African trade and SSA limits access to international market; poor performances of SSA region in world trade which is reflected in her marginal share in global exports; and SSA is probably the least developed industrial region in terms of manufactured trade – SSA has low export intensities in manufactured goods in most of the region countries. Furthermore, political instability, corruption, bureaucracy, inflation, exchange rate fluctuation, etc., are also likely to stale EGS in SSA region.

SSA, a low-income region has comparative advantage in services such as transport, travel and tourism-related activities or business process outsourcing. Services of all types are becoming easier to trade because of technological advancement, creating opportunities for firms in developing countries to expand trade in nontraditional products, including services as well as goods. However, SSA may not have the competencies and capability to benefit maximally. This is in spite the fact that approximately one quarter of all LDCs are net exporters of services (Fiorini & Hoekman, 2018). Attaining the SDGs is, to a significant extent, a services agenda. Eliminating poverty and hunger, improving health and educational outcomes, and reducing regional inequalities will require increased services capacity, and the productivity of a range of services activities, including transport, distribution, logistics, ICT, vocational training, and medical services (Fiorini & Hoekman, 2018).

General government final consumption expenditure (GGFCE)

Government expenditure is one of the most important macroeconomic instruments for influencing the level of economic activities in a country (Emudainohwo, Boateng, Brahma, & Ngwu, 2018; Kraipornsak, 2011). GGFCE (formerly general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security but excludes government military expenditures that are part of government capital formation. Government expenditure responds to both the need of public sector and helps in regulating the private sector (Aristis et al, 2021). Government expenditure roles has been increasingly improved particularly in the process of industrialization and in the provision of public goods and services, and wellbeing of the people. Government expenditure can boost EcG through consumption stimulation and the incentives to private investment (Aristis et al, 2021).

The traditional Keynesian (Keynes, 1936) asserts that public expenditures exogenously affect the national income). Macroeconomic approaches states that extraordinary levels of government consumption expenditure will increases employment levels of the population, production, and investment levels through investment multiplier effects on aggregate demand (Alimi, 2014; Al-Shatti, 2014; Ifere *et al.,* 2014; Oni *et al*., 2014). Thus, increase in government expenditure is likely to increase economic activities that have positive relationship to EcG (Emudainohwo et al, 2018). It induces increase in output depending on the magnitude and efficiency of expenditure multipliers on growth (Ceesay, Biagie & Bittaye, 2022). Wagner's Law (1958) on the other hand, states that public expenditure is an integral part of the national income and public expenditure is endogenously affected by the growth of income. Indeed, they have disagreement on the direction of the causality as well (Koyuncu & Ünal, 2020).

Some earlier studies have revealed government expenditure impact positively on EcG through improving the quality of public services, encouraging consumption, and promoting private investment (Arestis et al, 2021; Arvin et al, 2021; Wu et al, 2010). On the other hand, Landau (1983) study revealed that government consumption expenditure has negative relationship with the GDP based on the data for over 100 countries between 1961 and 1976. The result suggests that economic expansion of government jeopardizes EcG, although the welfare might not behave in the same way. Similar results are, Barro's (1991) in a study on 98

countries in the period 1960-1985 support the negative association between government consumption and EcG. Devarajan et al. (1996) showed that the diminishing productivity of the capital component of public expenditures is the main reason for the negative relationship. One conclusion deduced from above is that GGCFE will influence EcG and hence in GDP PCI.

Further argument for the inconsistency of the relationship between government expenditures and growth rate is that it is positive, but the sign of the relationship changes after a threshold level. The relationship is non-linear because productive expenditures might become unproductive if excess amount of them are available in the economy. Studies show that government expenditure harm EcG if used inefficiently (Hajamini & Falahi, 2018; Butkiewicz & Yanikkaya, 2011). Also, Tanninen (1999) reveals that the threshold level for government expenditure on public goods is 6.6% of the GDP. Ahmed and Miller (2000) assert that the different components of the government expenditures have different effects on the domestic investments in developing economies. For instance, expenditure on social security and welfare, and tax-financed government expenditure may crowd out domestic investments and consequently, impact negatively. But transportation and communication expenditures stimulate private investments in developing countries and so, impact positively. Hence, while government expenditures partly cause GDP to decrease, they partly cause GDP to increase in the long run. Fouladi's (2010) study shows the sectoral differences in the effectiveness of the government expenditure on GDP. According to Fouladi (2010), government resources directed to the oil and gas, or service sectors lead to expansion in the GDP. But, if the sources are spent in the agricultural, construction or industry and mining sectors, this has a negative effect on GDP. So, depending on which sector government expenditure is utilized, production and investment can be stimulated. Fölster and Henrekson (1999) argued that the analyses seeking to find the nature of the relationship between public expenditures and growth rate must consider that rich and poor economies do not behave in the same way. Thus, there is no consensus on the direction of the causality between consumption expenditures and GDP (Alexander, Dziobek & Galeza, 2018), and this may be applicable to GDP per capita growth.

There is a consensus in the literature that SSA region is beleaguered with several challenges, ranging from ineffective government institutions, weak democratic ideals (Asongu 2013) and very startling corruption perception statistics (Asongu, 2013; Mulinge & Lesetedi, 2002). Adopting various fiscal strategies, particularly, huge government expenditures, to overcome these challenges, had not been successful, as the economies of these countries had remained underdeveloped (Jumbo & Micah, 2021). The impact of government expenditures in these countries had been abysmal, with unemployment, income inequality and low standard of living remaining serious concerns within SSA (Jelilove & Musa 2016; Lawal 2007; Bose, Haque & Osborn, 2007). Furthermore, political instability, bureaucratic impediments, democratic unaccountability, high interest rate, high inflation rate and exchange rate, and high investment risk contribute to impact GGFCE and consequently on GDP PCI (proxy for SDGs) in SSA.

Inflation, consumer prices (INFL)

All the while, developing countries have been battling record high inflation, rising interest rates and looming debt burdens. Traditionally, inflation and EcG show linear relation, inflation impact on growth can be negative, neutral, or positive depending on whether money is complementary to capital (Fischer, 1983), super-neutral (Sidrauski, 1967), or substitute for capital (Tobin, 1965). But nations desire low and stable inflation rate and high EcG as primary objective of macroeconomic policies. Too high inflation harms the economy due to its undesirable redistribution and welfare effects while low inflation promotes EcG. When the inflation rate occurs at high levels; sustainable growth, fair distribution of income, expected returns of investment projects, competitiveness of the country in foreign trade, distribution of tax burdens, and macroeconomic variables are adversely affected (Ekinci, Tüzün, & Ceylan, 2020; Gokal & Hanif, 2004). One of the most significant effects of inflation is the uncertainty created when the inflation rate is fluctuating, which can reduce or increase consumer purchasing power.

In the financial market, the financial system plays the role of intermediation between the borrowers and lenders. The lenders will not be willing to lend if inflation increase, since their expected real rate of return on assets will be reduced, the consequences is reduction in available funds for lending. This is typical situation in SSA where inflation rate is always high. On the other hand, increasing inflation will induce borrowers to borrow, among them are new borrowers who are interested to take advantage of the situation, notwithstanding, they are likely to have higher default risk. This scenario consequently creates the problem of adverse selectin for the financial institutions called credit money rationing, since banks will not provide credits to new borrowers who have likely higher default risk. The bottom line is that an increase in inflation will induce lower EcG and low per capita income. But in the reverse, there will be no adverse selection mechanism rather, the Mundell-Tobin effect will take place and EcG is expected (Arcade Ndoricimpa, 2017). Thus, a low level of inflation is expected to promote growth while a high level of inflation will harm EcG due to credit rationing.

Based on the main objective of price stability, the best prescription is to adopt the inflation targeting strategy to ensure that inflation is determined at a level that does not affect economic activities negatively. The simple reason is that there is no theoretical evidence as to which inflation level is high or low for economic decision-making units. Therefore, empirical findings are required to determine which inflation level is a threshold for the EcG (Ekinci, Tüzün, & Ceylan, 2020). The relationship between price stability and EcG, especially for countries that implement price stability, has been quite remarkable in how and in what way inflation affects growth. The results of the applied studies conducted on this subject show that the relationship is negative in countries that

are not able to maintain price stability in the case of high inflation (Ekinci, Tüzün, & Ceylan, 2020). In SSA, not only that inflation rate is high, but there is also shortage of capital for investment and development. On this, inflation rate is more likely to impact per capita income or EcG negatively, and consequently not supporting SDGs.

Employment in services (EIS)

The recent global boom of the services sector relative to manufacturing sector suggests that services sector is worth considering for EcG. Increasing evidence shows positive relationship exists between services sector and EcG (Mishra et al., 2020; Magoti & Mtui, 2020; Kabeta & Sidhu, 2016; Ghani & O'Connell, 2016; Wu, 2015; Yusuf, 2015; Singh, 2010; Timmer & de Vries, 2009; Chakravarty & Mitra, 2009), and it importantly improved citizens wellbeing (Ndubuisi, Otioma & Tetteh, 2021). The development of the services sector contributes to economic rebalancing, restructuring, and upgrading towards a more inclusive and stable growth path. EISs is an essential component of efficient labour market. Thus, a sustainable EcG and development can no more be conceived without considering service sector development.

The services sector is interlinked with other sectors such as finance, transport, design, and retail (UNCTAD, 2018). Service sector trade is a vibrant component of world trade, it has matured in developed countries, but a new frontier for developing countries where lack of supply capacity and competitiveness, as well as insufficient regulatory and institutional capacities, constitutes a binding constraint on their growth potential (UNCTAD, 2018). Proportion of EIS sector in SSA is about half that of EU, suggesting that service sector is not yet matured in SSA.

Among the factors that contribute to increasing the share of employment in the service sector globally are: increase in final consumer demand as per capita income rises, technological changes that increase demand for labour in services, outsourcing of services-related activities from manufacturing to specialized services firms, growing role of services as providers of intermediate inputs, demographic changes, low productivity growth in services (Lee & Wolpin, 2006; Wolf, 2005; Baumol, 1967), and lower transport costs and barriers to trade that allow fragmentation of production, and increasing demand for specialized firms in services (UNCTAD, 2018; D'Agostino, Serafini & Ward-Warmedinger, 2006). However, lack of fund, corruption, conflicts, political interference, low per capita income, etc., remain some main constrain to employment in the service sector in SSA. For instance, mean per capita income for SSA is about half that obtained in EU.

Also, the acceptance or otherwise of EIS sector hinges on several factors that may affect per capita income. Amongst which are job satisfaction from good or bad working condition, and formal or informal jobs (OECD, 2001); job quality (the extent to which job's skill requirements, working arrangements, pay and hours of work correspond to the jobholder's own skills, preferences, and expectations) (OECD, 2001). Others are the incidence of part-time work and temporary work which affect workers productivity (Mishel et al., 2001; OECD, 2001; Letourneux, 1998). High levels of persistent unemployment, poor working conditions, limited/noncompliance with health and safety regulations, limited/absent employment protection, and low paid work involving long hours, large populations of youths not engaged in education, employment or training are common features in SSA, and as such will affect achieving SDGs.

The development of services, particularly infrastructure services, contributes significantly to economywide growth, as they constitute the fundamental backbone of any economy, and provide indispensable inputs to other products and services. Efficient and competitive services are catalytic to the expansion of global value chains (UNCTAD, 2018). Among developing countries, only a few countries have managed to become global suppliers in services. China and India are the leading services exporters among developing countries followed by Singapore and Hong Kong (China). Lack of supply capacity and competitiveness, insufficient regulatory and institutional capacities, lack of critical capacity to exploit comparative advantage, poor infrastructural facilities, low productivity growth rate, etc., are rampant in SSA and may combine to hinder SDGs in SSA.

Empirical Review

Empirical study report on the relationship between PUBDWS and SDGs (proxy with GDP PCI) is scarce. But the argued economic benefits of PUBDWS include higher economic productivity, more education, and health-care savings because of minimizing contamination of drinking water (WHO, UNICEF & World Bank, 2022). If so, it is expected to impact SDGs positively except otherwise where PUBDWS causes unhealthy ecosystem challenges.

Handriyani, Sahyar and Arwansyah (2018) studied the effect of household consumption on EcG based on secondary data over the period 2006-2016, from Province of North Sumatera. Two Stage Least Square method was used for the analyses. They found that HCE has a positive and significant effect on EcG. Diacona and Mahab (2015) investigate co-integration relationship among consumption, income, and GDP per capita (as a proxy of the level of standard of living) in time-series cross-section data. Panel data consists of 79 countries, divided into three categories: low-, middle- and high-income level, over the period 1980 to 2010. The study shows that the association between consumption and GDP is stronger for low- and middle-income countries. Rather than the sign of the relationship, Amin (2011) examined the causality between consumption expenditure and EcG in Bangladesh between

1976 and 2009. The study found that EcG significantly cause consumption in Bangladesh. Chioma (2009) however, asserts that there is not any significant causal relationship between the GDP and the personal consumption expenditure in Nigeria for the years between 1994 and 2007. Mishra (2011) tests the hypothesis that GDP composition have a consensus that the EcG is consumption-driven in developing countries by using data of India for a sample period of 1950 to 2009. The study revealed a negative relationship between real consumption expenditure and GDP. Though, ARDL bounds test results show that there is a long-run association between GDP and HCE in Turkey, there is no Granger causality link in any direction between GDP and HCE (Koyuncu & Ünal, 2020).

Hodey, Oduro and Senadza (2015) used GMM estimation techniques to study the relationship between export diversification and EcG from panel data of forty-two SSA countries. The study revealed that export diversification has a positively significant impact on EcG in SSA. Songwe and Winkler (2012) examined exports and exports diversification impact on growth and the policy implication for post-crisis export strategies based on panel of 30 selected SSA countries for the period 1995-2008. The result shows that export have direct impact on value added, labour productivity, and labour demand. It thus suggests that EGS have the tendency to improve PCI and consequently support SDGs. Guided by the hypothesis that says it is not export per se that matter but that different export components influence EcG differently, Gbaale and Mutenyo (2011) examined disaggregated data over the period 1988-2007 on export from 35 SSA countries extracted from World Bank WDI, IMF International Finance statistics, and UN's statistical database under Standard International Trade Classification (SITC). GMM estimator techniques was employed, and the study found that growth in agricultural exports and not growth in manufactured exports that significantly influence PCI growth.

Ceesay, Biagie and Bittaye (2022) examined GGFCE impact on EcG nexus for Gambia over the period 1977 - 2017. The study reveals GGFCE was not a significant determinant of EcG in Gambia. Nguyen and Bui (2022) examine corruption control in the impact of government expenditure on EcG for 16 emerging market and developing economies in Asia over the period 2002-2019. The study shows government expenditure have a negative impact on EcG. On a panel data study, Chia Yee Ee (2016) studied export-led growth hypothesis validity in selected SSA countries over the period 1985-2014. The study shows government expenditure and exports impact EcG positively, validating the hypothesis in SSA. Seok-Kyun (2014) examined fiscal policy effects on both equity and growth, whether it is possible to design fiscal spending that will enhance equity without sacrificing EcG and vice-versa? Cross-country panel vector autoregression was employed on WDIs and the study confirmed the growth effects of individual fiscal spending items as anticipated whereas distributional effects were either temporarily positive or negligible for most fiscal items.

Employing quantile regression, Mavikela et al. (2019) examined inflation effect on EcG for South Africa and Ghana with data over the period 2001 to 2016. The study shows that high inflation is positively related with growth in Ghana, but negatively related in South Africa. The study further shows that inflation has an adverse effect at all threshold levels on growth in the post 2008/2009 global financial crisis. Ndoricimpa (2017) examined nonlinearities in the inflation growth nexus in Africa and shows that there are nonlinearities in the inflation-growth nexus, suggesting that low inflation is growth enhancing for sub-sample of middle-income countries but neither affects EcG for the whole sample nor for the sub-sample of low-income countries. However, inflation above the threshold is inimical to EcG for all the cases considered.

Based on sample of 19 countries in Asia and Latin America, Timmer and de Vries (2009) find evidence in support of the services sector relevant to EcG. The study reveals that although the manufacturing sector is still relevant to EcG, the services sector emerges as a major contributor during periods of growth acceleration. Examining the response of EcG to the dynamics of the service sector in Nigeria, using annual data series, endogenous growth model, and autoregressive distributed lag technique, Adetokunbo and Edioye (2020) revealed transportation, communication service subsector, and health service subsector have significant and positive impact on EcG.

Methodology

The study used regional level annual time series data for SDGs (proxy with GDP per capita growth) and SDG indicators extracted from World Development Indicator (WDI) over the period 2000 to 2019. ARDL bounds test based on the Pesaran/Smith/Shin (2001) bounds test criteria was employed for the data analysis taken into consideration spurious regression diagnosis, lag-order selection, unit root test, homoskedasticity test, normality test, Ramsey regression specification-error test for omitted variables, and stability test. Additionally, Granger causality test was performed to ascertain directional causality of the study's variables.

Conceptual Framework

This study's conceptual framework model is presented in figure 3. It provides the pictorial demonstration of the study variables and their relationship.

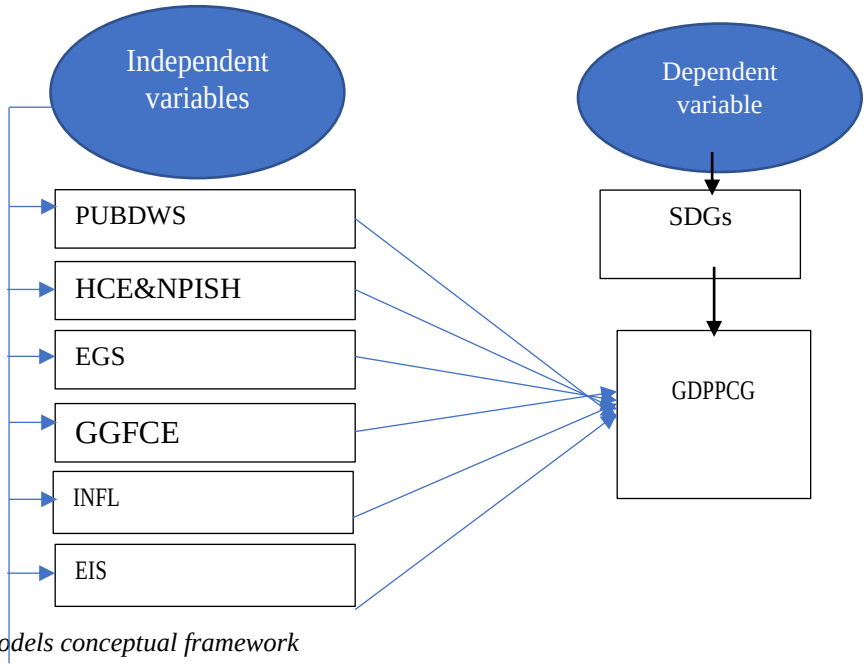

Figure 3: Models conceptual framework

Descriptive Statistic

Table 1 shows the summary statistics of the variables used in the study for 20 SSA countries for the period 2000-2019. The target variable is GDP per capita annual growth rate (GDPPCG) employed to represent satisfaction of SDGs in SSA. The explanatory variables are PUBDWS; HCE&NPISH; EGS; GGFCE; inflation, consumer prices; and EISs.

GDPPCG (annual growth rate) is average about 1.51% and maximum of 3.74%. Within the examined period, it also suffers negative growth of about -1.42%. The mean growth rate of PUBDWS is 54%. It shows that relatively, half of the population do not have access to PUBDWS. The minimum of those that have at least PUBDWS is about 44.67% while the maximum is about 63.61%. HCE&NPISH annual growth rate is average about 5%. It has experienced a minimal declining growth of -4.38% and maximum growth rate of 19.54%. It can be inferred that HCE&NPISH is increasing than the rate of decrease, and probably induce more severity than relief. EGS has a mean growth rate of 3.04%, minimal negative growth of -9.15%, and maximum growth rate of 14.67%. GGFCE mean growth rate is 5.18%, maximum growth rate of 18.49%, and minimal negative growth rate of -1.35%. Inflation, consumer prices (INFL) has mean growth rate of 5.39%, maximum and minimum growth rate of 10.38% and 2.78%, respectively. EISs has mean growth rate of 31.81%, minimum and maximum growth rate of 27.82% and 36.38%, respectively.

Table 1: Descriptive statistic (%)

Variable	Description	Mean	Std. dev.	Min	Max
GDPPC	GDP per capita growth (annual % growth)	1.51	1.53	-1.42	3.74
PUBDWS	People using at least basic drinking water services (% of population)	54.01	5.97	44.67	63.61
HCE&NPISH	Households and NPISHs Final consumption expenditure (annual % growth)	5.00	5.57	-4.38	19.54
EGS	Exports of goods and services (annual % growth)	3.04	5.71	-9.15	14.67
GGFCE	General government final consumption expenditure (annual % growth)	5.18	5.28	-1.35	18.49
INFL	Inflation, consumer prices (annual %)	5.39	1.65	2.78	10.38
EIS	Employment in services (% of total employment) (modeled ILO estimate)	31.81	2.84	27.82	36.38

Source: Researcher's computation using data extracted from WDI, 2023

Correlation matrix

From table 2, the target variable (GDPPC) exerts a strong negative correlation with PUBDWS (-0.6376) and EIS (-0.6376). It has positive correlation with HCE&NPISH (0.3113), EGS (0.4872), GGFCE (0.7218), and INFL (0.1203).

Table 2: Correlation matrix

	GDPPC	PUBDWS	HCE	EGS	GGFCE	INFL	EIS
GDPPC	1.0000						
PUBDWS	-0.6376*	1.0000					
HCE&NPISH	0.3113	-0.3218	1.0000				
EGS	0.4872*	-0.2015	-03444	1.0000			
GGFCE	0.7218*	-0.4677*	0.0256	0.4286	1.0000		
INFL	0.1203	-0.2947	-0.0376	0.0105	0.1414	1.000	
EIS	-0.6376	1.0000	-0.3218	-0.2947	-0.4677*	-0.2947	1.000

Source: Researcher's computation using data extracted from WDI, 2023

DATA EXPLORATION

Spurious Regression Diagnostic

The LMSRD module used to compute spurious regression diagnostic (table 3) shows that the data has no spurious regression in the model: their $R^2 < DW$.

Table 3: LMSRD: Stata module to compute Spurious Regression Diagnostic after OLS Regression

Rho Value	R^2	Durbin-Watson (DW) Test	df	Compare	Decision
0.1977	0.7578	1.5276	(7, 20)	R^2 (0.7578) < DW (1.5276)	No Spurious Regression

Source: Researcher's computation using data extracted from WDI, 2023

Lag-Order Selection

Lag-order selection criteria (table 4) suggests lag 4 for the model. The model LR, AIC, HQIC, and SBIC has least value at lag 4 with p-value < 0.05 in the model. It suggests that lag 4 will be employed for testing unit root.

Table 4: Lag-order selection criteria. Sample: 2004 thru 2019: Number of obs. = 16

Lag	Df		LR	P	FPE	AIC	HQIC	SBIC
0		208.93			1246.12	26.99	27.01	27.33
1	49	-42.03	333.8	0.000	0.001	12.25	12.39	14.96
2	49	.	.	.	-1.3e-95*	.	.	.
3	49	3293.37	.	.	.	-397.69	-397.39	-392.26
4	49	3552.5	518.27*	0.000	.	-430.06*	-429.78*	-424.66*
		* optimal lag Endogenous: GDPPC PUBDWS HNCFE EGS GGFCE INFL EIS Exogenous: _cons						

Source: Researcher's compilation using data extracted from WDI, 2023

Unit Root Test

The test (table 5) shows that only inflation is stationary at first difference while other variables are stationary at level.

Table 5: Philip-Perron stationarity test[3]

Variable	Level Test Statistic (Zt)		1st Difference Test Statistic (Zt)		Decision
	Test Statistics	MacKinnon Approximate P-Value for Z(t)	Test Statistics	MacKinnon Approximate P-Value for Z(t)	
GDPPC	-4.368*	0.0025	-7.728*	0.0000	1(0)
PUBDWS	-5.296*	0.0001	-2.853	0.1781	1(0)
HCE&NPISH	-9.005*	0.0000	-23.776*	0.0000	1(0)
EGS	-4.114*	0.0060	-8.741*	0.0000	1(0)
GGFCE	-3.621*	0.0281	-6.379*	0.0000	1(0)
INFL	-2.382	0.3895	-5.823*	0.0000	1(1)
EIS	-3.653*	0.0256	-3.208	0.0828	1(0)

* = statistically significance at 5%.

Source: Researcher's computation using data extracted from WDI, 2023

[3] At level critical value = -3.528 at 5%, while at 1st difference critical value = -3.532 at 5%.

Autocorrelation (serial correlation) test

Durbin's alternative test for autocorrelation and Breusch-Godfrey LM test for autocorrelation were used to examine serial correlation issue (table 6) The null hypothesis is Ho: no serial correlation against H_A: serial correlation. Durbin's alternative test p-value is 0.2557 and p-values for Breusch-Godfrey LM test is 0.0853, respectively. The p-value are greater than 0.05 suggesting no serial correlation challenge.

Table 6: Serial correlation (autocorrelation) tests.

	Durbin alternative test for autocorrelation			Breusch-Godfrey LM test for autocorrelation			Durbin-Watson d-statistic
Lags(p)	Chi^2	df	prob > chi^2	Chi^2	df	prob > chi^2	
1	1.292	1	0.2557	2.960	1	0.0853	(11, 19) = 2.531545

Source: Researcher's computation using data extracted from WDI, 2023

Heteroskedasticity

White's test for heteroskedasticity (table omitted) revealed chi^2 (18) = 19.00 and prob > chi^2 = 0.3918. The test null hypothesis is Ho: Homoskedasticity, Ha: unrestricted heteroskedasticity. The model revealed homoscedasticity since its p-values (0.3918) > 0.05.

Normality test

Skewness and Kurtosis joint test for normality and Jarque-Bera normality test were employed to examine data normality. The joint test returned p-values of 0.5813 (table 7a) while Jarque-Bera p-value is 0.7296 (table 7b). The normality test p-values are greater than 0.05 suggesting that the study's data are normally distributed.

Table 7a: Normality test

Table 4.10: Skewness and Kurtosis joint tests for normality		
Variable		resid
Obs.		19
Pr(skewness)		0.3485
Pr(kurtosis)		0.7333
---Joint test---	Adj chi^2(2)	1.08
	Prob > chi^2	0.5813

Table 7b: Normality test

Jarque-Bera normality test
0.6305 chi (2) = 0.7296

Specification test

Ramsey (1969) regression specification-error test (RESET) for omitted variables **w**as employed to examine model fitness based on omitted powers of fitted values of GDPPC (table 8). The test null hypothesis is model has no omitted variables. The test returned prob > F = 2.19 which is greater than 0.05. It indicates the model have no omitted variables issues.

Table 8: Ramsey RESET test for omitted variables

F(3, 10)	1.91
Prob > F	2.19

Source: Researcher's computation using data extracted from WDI, 2023

Test for parameter stability

Lastly, the variables data was subjected to stability tests (figure 3 and table 9). The comparison matrix lies inside circle in figure 3. Furthermore, none of the eigenvalue value is greater than 1 (table 10). They all suggest the models are stable.

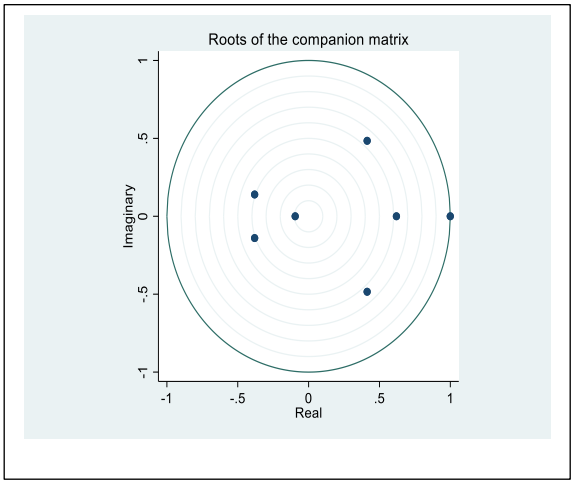

Table 9: Eigenvalue stability condition

Eigenvalue		Modulus
.99966995		.9997
.4129605 +	.4843941{	.636533
.4129605 -	.484394{	.636533
.6197614		.619761
-.3838631 +	.139906{	-405747
-.3808631 -	.1399061{	-405747
-.09473538		.094735
All the eigenvalues lie inside the unit circle. VAR satisfies stability condition.		

Figure 4: Stability test
Source: Researcher's computation using data extracted from WDI, 2023

ARDL Bounds Test

The F-statistic and the t-statistic results based on the Pesaran/Smith/Shin (2001) ARDL test[4] is presented in table 10. It reveal F > critical value [8.869 > 4.43 for l(1) regressor at 1%]. Furthermore, t < critical value [-5.41 < -4.99 for l(1) regressor at 1%]. The test results suggest level relationship among the variables in the model.

Table 10: Pesaran/Shin/Smith (2001) ARDL Bounds Test

	Critical Values				**Statistics**	
	I(0)	**I(1)**	**I(0)**	**I(1)**	**F[5]**	8.869
1%	3.15	4.43	-3.43	-4.99	t[6]	-5.41
2.5%	2.75	3.99	-3.13	-4.66		
5%	2.45	3.61	-2.86	-4.38		
10%	2.12	3.25	-2.57	-4.04		
K_6. K: # of non-deterministic regressors in long-run relationship critical values from Pesaran/Shin/Smith (2001)						

Source: Researcher's computation using data extracted from WDI, 2023

Regression results presentation

ARDL (1,0,1,1,0,0,1) lag structure was selected for the Bounds test based on Akaike Information Criteria (AIC). The ARDL (1,0,1,1,0,0,1) regression for the model is presented in table 11. The model explanatory variables explained about 86.74% of GDPPC. Its adjustment coefficient has negative sign indicating long-run equilibrium relationship among the variables, and at 1% level of significance (p-value = 0.001). Its speed of adjustment to economic shock or policy is 97.3% at 0.01 significant level. The result suggests that errors from prior year will be speedily corrected in the current period.

PUBDWS coefficient have strong direct association at 5% level (2.0017, 0.029) with GDPPC in the long-run and no association in the short-run. HCE&NPISH coefficient have strong direct association at 5% level (0.2241, 0.036) with GDPPC in the long-run but a weak inverse association (-0.1021, 0.100) with GDPPC in the short-run. EGS coefficient have weak negative relationship with GDPPC (-0.0672, 0.257) in the long-run but a weak positive impact with GDPPC at 10% level (0.0758, 0.091) in the short-run. GGFCE coefficient have weak positive association with GDPPC (0.0667, 0.177) in the long-run and no association in the short-run. INFL coefficient have weak negative relationship with GDPPC (-0.1480, 0.245) in the long-run but no relationship in

[4] H_0: no levels relationship
[5] Accept if F < critical value for I(0) regressors. Reject if F > critical value for I(1) regressors
[6] Accept if t > critical value for I(0) regressors. Reject if t < critical value for I(1) regressors

the short-run. EIS coefficient have strong inverse association (-4.4724, 0.021) at 5% level with GDPPC in the long-run but a strong direct impact with GDPPC (4.8911, 0.020) in the short-run.

Table 11: ARDL regression results

	ARDL (1,0,1,1,0,0,1) regression			
				R^2 = 0.9411
				Adj R^2 = 0.8674
				Root MSE = 0.5842
	Log likelihood = -8.5303369			
D.GDPPC	**Coef.**	**Std. err**	**t**	**p>|t|**
ADJ				
GDPPC				
L1	-0.9730	0.1796	-5.42	0.001
LR				
PUBDWS	2.0017	0.7514	2.66	0.029
HCE&NPISH	0.2241	0.0893	2.51	0.036
EGS	-0.0672	0.0551	-1.22	0.257
GGFCE	0.0667	0.0450	1.48	0.177
INFL	-0.1480	0.1179	-1.25	0.245
EIS	-4.4724	1.5559	-2.87	0.021
SR				
HCE&NPISH				
D1	-0.1021	0.0550	-1.86	0.100
EGS				
D1	0.0758	0.0394	1.92	0.091
EIS				
D1	4.8911	1.6856	2.90	0.020
_cons	31.9899	10.3479	3.09	0.015

Source: Researcher's computation using data extracted from WDI, 2023

Granger Causality

The Granger causality results of the variables are presented in table 12. They show that only PUBDWS and EGS have bidirectional Granger causality. Unidirectional Granger causality run from PUB DWS to GDPPC (i), from GDPPC to EGS (iii), from GDPPC to GGFCE (iv), from EIS to GDPPC (vi), from PUBDWS to HCE&NPISH (viii), PUBDWS to GGFCE (x), INFL to PUBDWS (xi), HCE&NPISH to EGS (xiv), INFL to EGS (xx), EIS to EGS (xxi), GGFCE to INFL (xxii) and from EIS to GGFCE (xxiv).

In instances of unidirectional Granger causality, there are no directional flows from GDPPC to PUBDWS (i), from EGS to GDPPC (iii), from GDFCE to GDPPC (iv), from GDPPC to EIS (vii), from HCE&NPISH to PUBDWS (viii), PUBDWS to GGFCE (x), PUBDWS to INFL (xi), EGS to HCE&NPISH (xiv), EGS to INFL (xx), EGS to EIS (xxi), INFL to GGFCE (xxiii), and from GGFCE to EIS (xxiv).

There is no directional flow between GDPPC and HCE&NPISH (ii), GDPPC and INFL (v), PUBDWS and EIS (xii), HCE&NPISH and GGFCE (xv), HCE&NPISH and INFL (xvi), HCE&NPISH and EIS (xvii), EGS and GGFCE (xix), and INFL and EIS (xxvi).

	Table 12: Granger causality				
	Equation	**Excluded**	**Direction**	**Chi^2**	**Prob > chi^2**
i	GDPPC	PUBDWS	⬅	16.72	0.000
	PUBDWS	GDPPC		1.999	0.157
ii	GDPPC	HCE		1.316	0.251
	HCE&NPISH	GDPPC		0.033	0.856

	Table 12: Granger causality				
	Equation	**Excluded**	**Direction**	**Chi²**	**Prob > chi²**
iii	GDPPC	EGS		2.525	0.112
	EGS	GDPPC	⬅	5.355	0.021
iv	GDPPC	GGFCE		0.248	0.619
	GGFCE	GDPPC	⬅	5.172	0.023
v	GDPPC	INFL		0.769	0.381
	INFL	GDPPC		0.109	0.741
vi	GDPPC	EIS	⬅	18.911	0.000
	EIS	GDPPC		2.267	0.132
vii	GDPPC	ALL	⬅	59.001	0.000
viii	PUBDWS	HCE&NPISH		0.198	0.656
	HCE&NPISH	PUBDWS	⬅	4.038	0.044
ix	PUBDWS	EGS	⬅	5.569	0.018
	EGS	PUBDWS	⬅	41.314	0.000
x	PUBDWS	GGFCE		0.1282	0.720
	GGFCE	PUBDWS	⬅	12.017	0.001
xi	PUBDWS	INFL	⬅	8.149	0.004
	INFL	PUBDWS		0.183	0.669
xii	PUBDWS	EIS		1.500	0.221
	EIS	PUBDWS		3.786	0.052
xiii	PUBDWS	ALL	⬅	27.136	0.000
xiv	HCE&NPISH	EGS		0.005	0.944
	EGS	HCE&NPISH	⬅	12.113	0.001
xv	HCE&NPISH	GGFCE		0.347	0.556
	GGFCE	HCE&NPISH		0.072	0.789
xvi	HCE&NPISH	INFL		0.110	0.740
	INFL	HCE&NPISH		0.253	0.615
xvii	HCE&NPISH	EIS		2.864	0.091
	EIS	HCE&NPISH		2.424	0.120
xviii	HCE&NPISH	ALL	⬅	28.386	0.000
xix	EGS	GGFCE		0.356	0.551
	GGFCE	EGS		1.972	0.160
xx	EGS	INFL	⬅	15.829	0.000
	INFL	EGS		0.135	0.714
xxi	EGS	EIS	⬅	40.811	0.000
	EIS	EGS		0.813	0.367
xxii	EGS	ALL	⬅	81.388	0.000
xxiii	GGFCE	INFL		3.629	0.057
	INFL	GGFCE	⬅	11.937	0.001
xxiv	GGFCE	EIS	⬅	13.031	0.000
	EIS	GGFCE		0.576	0.448
xxv	GGFCE	ALL	⬅	26.308	0.000
xxvi	INFL	EIS		0.197	0.657
	EIS	INFL		2.968	0.085
xxvii	INFL	ALL	⬅	25.942	0.000
xxviii	EIS	ALL	⬅	32.608	0.000

Source: Researcher's computation using data extracted from WDI, 2023

Discussion

The study's data exploration and the regression results show robustness. The speed of adjustment of the target variable to equilibrium is high at 97.3% per year and it is statistically significant at 1%.

The strong positive association between PUBDWS and GDPPC suggests PUBDWS is strongly acceptable as a means of achieving SDGs in the long-run. A unit increase(decrease) in PUBDWS will cause about 2.0017 increase(decrease) in SDGs in the long run. It probably supports the argument that it will bring higher economic productivity, positive health benefits, tend to meet the criteria for safely managed drinking water services (WHO, UNICEF & World Bank, 2022). This is in spite the fact that on the average, half the SSA population still do not have PUBDWS. The study suggests more effort to enhance PUBDWS criteria for supporting SDGs in SSA.

HCE&NPISH has strong direct influence on GDPPC in the long-run but a weak inverse bearing with GDPPC in the short-run. The long run result corroborates Diacona and Mahab (2015) that revealed strong positive relationship between consumption and GDP in low- and middle- level income countries, and Handriyani et al. (2018) that showed HCE has strong positive impact on EcG. It however, failed to support Mishra (2011) that reported inverse relationship between HCE and GDP. A logical conclusion is perhaps, HCE&NPISH in SSA countries may have a multiplying effect in the long run. The weak inverse HCE&NPISH relationship in the short run suggests a temporary harm but will reverse in the future. However, it may be because, items traded are relatively more expensive in poorer countries in spite having lower income levels, or household spending in the region has remained relatively stagnant (Signe, 2018; Nakamura et al.,2016).

EGS weak adverse impact in the long run, and fragile positive bearing in the short run is not too good. The result did not support Hodey et al (2015) that revealed export diversification has positive significant bearing on EcG in SSA, nor Songwe and Winkler (2012) that shows export have direct impact on value added, labour productivity, and labour demand, a tendency to improve PCI and consequently support SDGs. It suggests that the total average EGS weakly discourage SDGs in the long run, and in the short run, has a weak support for SDGs in SSA.

GGFCE has insignificant positive bearing with SDGs in the long-run and no association in the short run. The long-run result collaborates Ceesay et al (2022) that reveal GGFCE is not a significant determinant of EcG in Gambia. It however, fails to support Nguyen and Bui (2022) that shows government expenditure have negative impact on EcG in Asia, and earlier studies that shows GGFCE impact EcG positively (Arestis et al, 2021; Arvin et al, 2021; Chia Yee Ee, 2016; Wu et al, 2010.). The result perhaps is showing that increasing government expenditure is likely to increase economic activities that will have positively related tendencies for EcG (Aristis et al, 2021; Kraipornsak, 2021; Emudainohwo et al, 2018), and perhaps support SDGs.

Inflation shows weak negative relationship with GDPPCG in the long-run but no relationship in the short-run. The result support adverse effect of inflation on growth (Mayikela et al., 2019; Ndoricimpa, 2017). The result suggests the continues high inflation in SSA harms the economy due to its undesirable redistribution and welfare effects in the long run. The implication is that inflation is inimical to SDGs in SSA.

EIS shows strong inverse association with GDPPCG in the long-run but a strong direct impact with GDPPCG in the short-run. The strong positive association between EIS and economic development in the short-run is supported by several earlier studies (Timmer & de Vries, 2009; Chakravarty & Mitra, 2009; Singh, 2010; Wu, 2015; Yusuf, 2015; Kabeta & Sidhu, 2016; Ghani & O'Connell, 2016; Magoti & Mtui, 2020; Mishra et al., 2020; Adetokunbo & Edioye ,2020). The long-run negative effect of the EIS on EcG however is not supported in this study. The result suggests EIS in the short-run tend to aid EcG but long-standing poor infrastructure and governance perhaps pull-down EcG in the long-run.

Conclusion and Policy Implication

The study is vigorously tested and examined. Long-run cointegration exist among the variables with a speed of adjustment to shocks at 97.3% per year. In the long-run, PUBDWS, HCE&NPISH, and GGFCE strong positive bearing suggests they are pillars to SDGs in the long-run. government purposeful improvement on them is recommended. EGS, inflation and EIS exert negatively with GDPPC in the long-run suggesting that there are issues within the economic system that need to be reviewed and resolved to create a friendlier environment that will support SDGs in the long-run. Government is advised to provide welfare benefits and subsidies citizens ought to enjoy. Additionally, government should enhance the enabling environment through providing infrastructure, creating capital investment, minimize inflation and interest rate, and intensify research and development activities.

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