

Article

# Sustainable Development in African Countries: An Indicator-Based Approach and Recommendations for the Future

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**Abstract:** This study addresses problems related to the level of sustainable development in African countries in the years 2002–2016. The introduction presents the current situation in Africa, the occurring transformations as well as the goals and definitions of sustainable development. The significance of social order in the aforementioned development has also been highlighted. The next part of the article features sustainability indicators, selected for the analysis and covering all the essential aspects, i.e., social, economic, environmental, spatial, institutional and political areas. The applied research method was the synthetic measure of development (SMD), whereas the data for calculations and analyses were retrieved from the sources of the World Bank. The key part of the study presents the research results showing the position of individual countries regarding the level of implementation of the sustainable development concept in the period 2002–2016. As part of the added value the selected problems of Africa and ways of solving them, along with the recommendations for the future, were listed and characterised. It was concluded that the situation of the African countries, in terms of their sustainable development level, improved significantly in the period under analysis. The crucial problem is that the discussed countries are still experiencing a relatively unfavourable situation in this respect. Cape Verde and Ghana are among the countries recording the best results. The least favourable situation was observed in the Democratic Republic of the Congo, Liberia, Chad, Central African Republic and Eritrea.

**Keywords:** sustainable development; linear ordering; African countries; socio-economic development; sustainable development orders; social inclusion; development problems; good governance; development indicators

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## 1. Introduction

The reasons for the development of the presented study include the need to analyse the current situation of African countries in the context of sustainable development implementation level. Such development is of particular importance in relation to African countries. As opposed to other continents, struggling with problems resulting from the process of socio-economic development (e.g., congestion, demographic issues, climate changes, migration of refugees, excessive consumerism, abandoning interpersonal bonds, income disproportions of particular social groups, etc.), Africa still faces the need to solve quite mundane problems from either the European or American point of view.

For the purposes of this study, it has been adopted that sustainable development is a socio-economic movement aimed at integrating political, economic and social activities, focused on protecting the natural balance and the sustainability of basic natural processes to ensure meeting the basic needs of certain communities and citizens of both the contemporary and future generations [1,2].

This definition puts emphasis on caring for the future, and thus, the aspect of timeless significance of sustainable development and its individual orders remains particularly evident. At the same time, the awareness of the discussed development and ecological responsibility importance [3,4] depend on the development level of a given country, the effectiveness of implemented public policies, the level of education, all taking into account due care for the environment and the quality of social capital [5–11].

Taking another approach, sustainable development is understood as the effect of qualitative and quantitative transformation processes occurring in social, economic and natural spheres, assuming good governance of space. In simplified terms, it results from positive changes in the level of economic and social development, which by no means deteriorates the natural environment quality but, in turn, focuses on its gradual improvement [12–15].

At this point, it should be noted that sustainable development, apart from due care for future generations, should also improve the current situation in particular countries and regions through stimulating socio-economic development. The above assumption is of a global nature [16]. Within the framework of the discussed development, the following can be expected: gross domestic product growth, increase in expenditures on innovation (respecting natural environment), counteracting poverty, reducing unemployment rate and employment growth, higher fertility rate, care for environmental issues, including selective waste collection, renewable energy and legally protected areas, as well as the effective functioning of non-governmental organizations and nurturing civil liberties. In other words, the implementation of sustainable development concept favours the harmonious development of territorial units, i.e., countries, regions, municipalities and cities [17–22].

For African countries, the aforementioned assumptions are valuable and should constitute a reference point for actions taken by the authorities of individual independent states. It has to be emphasized that either automatic or unreflective copying of developmental patterns, adopted in Western European countries or the United States is, generally, not expected [23]. The more so, as such simple replication would, on the one hand, not work and, on the other, be impossible to implement. The countries of the African continent must and should take into account their own history, cultural heritage, religions, mentality, climate and demographic conditions. Nevertheless, the basic rules and principles of sustainable development should be maintained [24–27].

On the basis of the above theoretical assumptions, it can be assumed that sustainable development is the most important aspect of the carried-out development policy. Adopting such an assumption focuses, in a natural manner, the individual development policies of African countries (e.g. social, regional, industrial, agricultural, scientific and ecological policy) on achieving the global sustainable development goals (SDGs) [28]. For the record, they are as follows [29–32]:

- end poverty in all its forms everywhere;
- end hunger, achieve food security and improved nutrition and promote sustainable agriculture;
- ensure healthy lives and promote well-being for all at all ages;
- ensure inclusive and equitable quality education and promote lifelong learning opportunities for all;
- achieve gender equality and empower all women and girls;
- ensure availability and sustainable management of water and sanitation for all;
- ensure access to affordable, reliable, sustainable and modern energy for all;
- promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;
- build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;
- reduce inequality within and among countries;
- make cities and human settlements inclusive, safe, resilient and sustainable;
- ensure sustainable consumption and production patterns;
- take urgent action to combat climate change and its impacts;

- conserve and sustainably use the oceans, seas and marine resources for sustainable development;
- protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss;
- promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels;
- strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development.

If one takes a closer look at the objectives identified above, one can get an impression that they require urgent, long-term and consistent implementation in the vast majority of African countries. At this point, the essence and significance of the presented study, for both the science and the practical spheres, becomes apparent. It is impossible to carry out the goals of sustainable development effectively without prior knowledge of the situation and position of individual African countries in this respect. Moreover, the subject literature does not provide many publications discussing the analysed problem in such a comprehensive manner. The applied indicator approach, along with all its imperfections (e.g., the quality and availability of public statistics) presents, beyond any doubt, advantages such as potential comparability and measurability. Nevertheless, the applied research method should be referred to as one of the proposals for measuring sustainable development in Africa.

In addition, the objectives of Agenda 2063 [33] target Africa specifically as the strategic framework aimed at socio-economic transformations on the African continent for the 50 years to come. Agenda 2063 is intended to accelerate the implementation of the existing continental initiatives regarding growth and sustainable development. The goals of Agenda 2063 are generally convergent with the aforementioned SDGs. Among them, the following are listed: a high standard of living, quality of life and well-being for all citizens; well-educated citizens and skills revolution underpinned by science, technology and innovation; healthy and well-nourished citizens; transformed economies; modern agriculture for increased productivity; blue ocean economy for accelerated economic growth; environmentally sustainable and climate-resilient economies and communities; a united Africa; continental financial and monetary institutions established and functional; world-class infrastructure criss-crosses Africa; democratic values, practices, universal principles of human rights, justice and the rule of law entrenched; capable institutions and transformative leadership in place; peace, security and stability are preserved; a stable and peaceful Africa; a fully functional and operational African Peace and Security Architecture (APSA); African cultural renaissance is pre-eminent; transformed economies; engaged and empowered youth and children; Africa as a major partner in global affairs and peaceful coexistence and Africa takes full responsibility for financing her development goals [33].

It should be noted that the Millennium Development Goals (MDGs) were also important for the continent, among which, the following can be listed: eliminating extreme poverty and hunger; providing universal primary education; supporting gender equality and empowering women; reducing children mortality rate; improving health condition of pregnant women and post-natal women; fighting AIDS, malaria and other diseases; ensuring ecological balance of the environment [34] and developing and strengthening the global partnership in development issues [35,36].

The research presented in this study is based on the division of thematic areas and the resulting indicators inspired by the European Union approach to sustainable development (see Table 1). The aforementioned thematic areas (Sustainable Development Indicators (SDI) theme) include: socioeconomic development, sustainable consumption and production, social inclusion, demographic changes, public health, climate change and energy, sustainable transport, natural resources, global partnership and good governance. This solution has been used for several reasons: the convergence of thematic areas with new SDGs and other lists of sustainable development goals, the availability of reliable public statistics (World Bank) and the possibility of conducting research in a long-term perspective (2002–2016).

The problem and specificity of African countries is also manifested in their diversity in terms of the socio-economic development level. The origins of this situation should be perceived in, e.g.,

historical events [37], the post-colonial past, the dominant religion, the availability of natural resources, the specific climate, attitude to democratic principles, the occurrence of armed conflicts, etc. On the one hand, there is a relatively richer north (e.g., Egypt, Tunisia and Morocco) and South Africa, whereas on the other hand, there are countries suffering great poverty (Malawi, Niger, Democratic Republic of the Congo, Burundi and Central African Republic). We also deal with the so-called failed states (e.g., Somalia, Chad, Sudan and Zimbabwe), which are significantly underdeveloped [38]. Generally, Africa, compared to other parts of the world, is a poor continent; however, at the same time, a large one with a future-oriented potential in developing higher life quality on the worldwide scale [39]. At present, Africa faces the decline in its quality of life. This situation is a challenge for the implementation of sustainable development principles. The data from the International Monetary Fund and the United Nations in terms of the gross domestic product (GDP) per capita and the Human Development Index are helpful in conducting analyses of socio-economic stratification and the level of wealth in African countries. Having analysed them, it becomes clear that the ranking position of the majority of African countries remains very low [40,41].

The social aspect of sustainable development, including social inclusion, seems to be particularly important for the African countries [42,43]. In other words, the broadly understood social inclusion can become the key and the accelerator of positive developmental changes in African countries [44–46]. Social inclusion, also approached as social integration, represents the process aimed at including individuals, groups or social categories, e.g., persons with disabilities, to function in a broader society. The opposite of inclusion is exclusion, i.e., social exclusion and marginalization. The African countries were frequently analysed in terms of social exclusion, whereas nowadays a greater focus on inclusion is more required [47,48].

The purpose of the study is to present and analyse the position of individual African countries in relation to a sustainable development level in the period 2002–2016. It should be noted that the study covers a relatively long period of time, i.e., over a dozen years. The indicators selected for the conducted analyses constitute a relatively large set covering the general areas responsible for achieving the sustainable development goals. The choice of these indicators resulted from the availability of reliable public statistics. The synthetic development measure (SMR) was the research method used to assess the implementation of sustainable development patterns in African countries and the data for calculations were retrieved from the sources of the World Bank.

## 2. Research Method

To start with, it should be pointed out that indicators represent quantitative tools, which synthesize and simplify the data relevant in the assessment of specific phenomena. They are useful for communication and evaluation, and facilitate making strategic decisions. It can be adopted that indicators remain one of the basic instruments for monitoring sustainable development because they present this concept of development in a rational and measurable manner [49,50]. For the purposes of this study, the sustainable development indicators can be defined as a statistical measure informing about the sustainability of social, environmental and economic development [51].

The indicators allowing the analysis of the progress in implementing the above-mentioned development concept in relation to the selected territorial units, in this case the group of African countries were chosen for the study. The division of thematic areas (SDI theme) was inspired by the approach to measure the sustainable development level adopted by the European Union [52,53]. Moreover, for each indicator the availability of reliable public statistics and the World Bank data was checked prior to the study. The list of selected indicators is provided in Table 1. The table also presents the type (interpretation) of the indicators and the coordinates (values) of the joint object-pattern for the years 2002–2016.

**Table 1.** The indicators of sustainable development selected for the analysis.

SDI Theme	Indicator	The Importance of An Indicator for Sustainable Development	Indicator Type	Reference Value
Socio-economic development	GDP per capita (current US\$)	GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars.	Stimulant	22742.4
	Foreign direct investment, net inflows (BoP, current US\$)	Foreign direct investment refers to direct investment equity flows in the reporting economy. It is the sum of equity capital, reinvestment of earnings, and other capital. Direct investment is a category of cross-border investment associated with a resident in one economy having control or a significant degree of influence on the management of an enterprise that is resident in another economy. Ownership of 10 percent or more of the ordinary shares of voting stock is the criterion for determining the existence of a direct investment relationship. Data are in current U.S. dollars.	Stimulant	11578.1
	Unemployment, total (% of total labor force)	Unemployment refers to the share of the labor force that is without work but available for and seeking employment.	Destimulant	0.7
Sustainable production and consumption	Arable land (% of land area)	Arable land includes land defined by the Food and Agriculture Organization of the United Nations (FAO) as land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens and land temporarily fallow. Land abandoned as a result of shifting cultivation is excluded.	Stimulant	49.3
	Access to electricity (% of population)	Access to electricity is the percentage of population with access to electricity. Electrification data are collected from industry, national surveys and international sources.	Stimulant	100
Social inclusion	Crop production index (2004–2006 = 100)	Crop production index shows agricultural production for each year relative to the base period 2004–2006. It includes all crops except fodder crops. Regional and income group aggregates for the FAO's production indexes are calculated from the underlying values in international dollars, normalized to the base period 2004–2006.	Stimulant	235.7
	Individuals using the Internet (% of population)	Internet users are individuals who have used the Internet (from any location) in the last 3 months. The Internet can be used via a computer, mobile phone, personal digital assistant, games machine, digital TV, etc.	Stimulant	58.3
	Unemployment, youth total (% of total labor force ages 15–24) (modeled International Labour Organization (ILO) estimate)	Youth unemployment refers to the share of the labor force ages 15–24 without work but available for and seeking employment.	Destimulant	0.7

Table 1. Cont.

SDI Theme	Indicator	The Importance of An Indicator for Sustainable Development	Indicator Type	Reference Value
Demographic changes	Birth rate, crude (per 1000 people)	Crude birth rate indicates the number of live births occurring during the year, per 1000 population estimated at midyear. Subtracting the crude death rate from the crude birth rate provides the rate of natural increase, which is equal to the rate of population change in the absence of migration.	Stimulant	52.9
	Population ages 65 and above (% of total)	Population ages 65 and above as a percentage of the total population. Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship.	Destimulant	2.2
	Age dependency ratio (% of working-age population)	Age dependency ratio is the ratio of dependents—people younger than 15 or older than 64—to the working-age population—those ages 15–64. Data are shown as the proportion of dependents per 100 working-age population.	Destimulant	44.4
Public health	Prevalence of HIV, total (% of population ages 15–49)	Prevalence of HIV refers to the percentage of people ages 15–49 who are infected with HIV.	Destimulant	0.1
	Life expectancy at birth, total	Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.	Stimulant	76.1
	Mortality rate, infant (per 1000 live births)	Infant mortality rate is the number of infants dying before reaching one year of age, per 1000 live births in a given year.	Destimulant	11.7
	Health expenditure, total (% of GDP)	Total health expenditure is the sum of public and private health expenditure. It covers the provision of health services (preventive and curative), family planning activities, nutrition activities and emergency aid designated for health, but does not include provision of water and sanitation.	Stimulant	14.4
Climate change and Energy	CO <sub>2</sub> emissions (kg per 2010 US\$ of GDP)	Carbon dioxide emissions are those stemming from the burning of fossil fuels and the manufacture of cement. They include carbon dioxide produced during consumption of solid, liquid and gas fuels, and gas flaring.	Destimulant	0.03
	Renewable energy consumption (% of total final energy consumption)	Renewable energy consumption (% of total final energy consumption).	Stimulant	98.3
	Total greenhouse gas emissions (kt of CO <sub>2</sub> equivalent)	Total greenhouse gas emissions in kt of CO <sub>2</sub> equivalent are composed of CO <sub>2</sub> totals excluding short-cycle biomass burning (such as agricultural waste burning and Savannah burning), but including other biomass burning (such as forest fires, post-burn decay, peat fires and decay of drained peatlands), all anthropogenic CH <sub>4</sub> sources, N <sub>2</sub> O sources and F-gases (HFCs, PFCs and SF <sub>6</sub> ).	Destimulant	294.0
Sustainable transport	CO <sub>2</sub> emissions from liquid fuel consumption (kt)	Carbon dioxide emissions from liquid fuel consumption refer mainly to emissions from use of petroleum-derived fuels as an energy source.	Destimulant	102.7
	Death rate due to road traffic injuries per 100,000 population	Mortality caused by road traffic injury is estimated road traffic fatal injury deaths per 100,000 population.	Destimulant	11.1

Table 1. Cont.

SDI Theme	Indicator	The Importance of An Indicator for Sustainable Development	Indicator Type	Reference Value
Natural resources	Forest area (% of land area)	Forest area is land under natural or planted stands of trees of at least 5 meters in situ, whether productive or not, and excludes tree stands in agricultural production systems (for example, in fruit plantations and agroforestry systems) and trees in urban parks and gardens.	Stimulant	89.3
	Forest rents (% of GDP)	Forest rents are roundwood harvest times the product of average prices and a region-specific rental rate.	Destimulant	0.0
	People using basic drinking water services (% of population)	The percentage of people using at least basic water services. This indicator encompasses both people using basic water services as well as those using safely managed water services. Basic drinking water services is defined as drinking water from an improved source, provided collection time is not more than 30 minutes for a round trip. Improved water sources include piped water, boreholes or tubewells, protected dug wells, protected springs and packaged or delivered water.	Stimulant	98.4
	Total natural resources rents (% of GDP)	Total natural resources rents are the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents and forest rents.	Destimulant	0.02
Global partnership	Import value index (2000 = 100)	Import value indexes are the current value of imports (c.i.f.) converted to U.S. dollars and expressed as a percentage of the average for the base period (2000). United Nations Conference on Trade and Development (UNCTAD)'s import value indexes are reported for most economies. For selected economies for which UNCTAD does not publish data, the import value indexes are derived from import volume indexes (line 73) and corresponding unit value indexes of imports (line 75) in the IMF's International Financial Statistics.	Stimulant	1529.9
	Imports of goods and services (% of GDP)	Imports of goods and services represent the value of all goods and other market services received from the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees and other services, such as communication, construction, financial, information, business, personal and government services. They exclude compensation of employees and investment income (formerly called factor services) and transfer payments.	Stimulant	236.4
	Improved water source (% of population with access)	Access to an improved water source refers to the percentage of the population using an improved drinking water source. The improved drinking water source includes piped water on premises (piped household water connection located inside the user's dwelling, plot or yard), and other improved drinking water sources (public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs and rainwater collection).	Stimulant	99.7
Good governance	Voice and accountability	This indicator reflects the extent to which a given country population is capable of participating in the election of their authorities. Additionally, freedom of speech and expression level, the functioning of free media or the freedom of association are taken into account. The particular elements of good governance are extremely important in an overall perception of sustainable development concept implementation.	Stimulant	1.01
	Rule of law	Rule of law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police and the courts, as well as the likelihood of crime and violence.	Stimulant	0.73
	Control of corruption	Control of corruption capturing perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as capture of the state by elites and private interests.	Stimulant	1.21

Source: World Development Indicators. The World Bank DataBank [54].

The presented approach to the study of sustainable development level has the form of a general analysis focusing on its individual aspects, which have to be taken into account for the purposes of an overall implementation of this development concept. Each of the key spheres related to sustainable development, i.e., social, economic and environmental spheres, were taken into account in the process of selecting variables for the study.

When attempting to assess the implementation of sustainable development concept, it is essential to define the set of indicators characterising the individual aspects related to each of the sustainable development spheres and specifying the indicators from the perspective of their importance for sustainable development. It is also crucial to work out the quantitative objectives to be achieved in order to identify the extent of the sustainable development concept implementation. Defining quantitative objectives depends on the nature of each variable. In principle, the following variables can be distinguished: stimulants, destimulants and nominants.

The synthetic measure of development (SMD) was the method used to assess the implementation of sustainable development patterns in African countries. SMD is applied for the linear ordering of objects characterised by many diagnostic variables, which are later replaced by one diagnostic value. The SMD construction procedure is carried out based on several consecutive stages [55]:

(1) Selecting diagnostic features (indicators) and determining the nature of variables in relation to the implementation of sustainable development concept: stimulant, destimulant and nominant.

(2) For indicators' comparability, the normalization of diagnostic features was carried out using a zero-unitarization procedure based on the following formula:

$$z_{ij} = \frac{x_{ij} - \min_i x_{ij}}{\max_i x_{ij} - \min_i x_{ij}} \quad (1)$$

where:  $z_{ij}$ —value of the  $j$ -th diagnostic characteristic (indicator)  $j = 1, 2, \dots, k$  in the  $i$ -th object  $i = 1, 2, \dots, N$  after unitarization,  $x_{ij}$ —realisation of  $j$ -th diagnostic characteristic in the  $i$ -th object,  $\min_i x_{ij}$  ( $\max_i x_{ij}$ )—the lowest (the highest) value of the  $j$ -th diagnostic characteristic  $x_{ij}$ . Normalisation was carried out for a matrix covering the data from 2002–2016. It allowed defining the joint development pattern. As a result of unitarization the values of characteristics take the range  $\langle 0,1 \rangle$ , with 0 value for the year in which the indicator recorded the lowest (minimum) value in 2002–2016, and 1 for the highest value. After applying zero unitarization the variable is measured on an interval scale with zero minimum [56].

(3) Determining coordinates of the object-pattern. The top pattern of development was adopted as the model one, i.e., in the case of stimulants maximum values were considered the most favourable values of diagnostic characteristics, in the case of destimulants—minimum values, and for nominants—the lowest absolute value from the difference between the value of the characteristic and the optimal value. The most favourable indicator values, as total of 2002–2016, make up the object-pattern.

(4) Determining the distance of objects from the object-pattern using the Euclidean distance and the synthetic measure of development (SMD) for  $i$ -th object based on the formula:

$$SMR_i = 1 - \frac{d_{it0}}{d_0} \quad (2)$$

where:  $d_{it0}$ —the Euclidean distance between  $i$ -th object in the  $t$ -th period and 0 object-pattern, and  $d_0$ —distance between the pattern and ant-pattern [57].

The values of development measure are normalised in the interval  $\langle 0,1 \rangle$ , with the value equal to 1 for the pattern. The higher the level of the phenomenon, the higher the value of the development measure. The values of synthetic measures of development (SMD) determined based on the Euclidean distance allowed for specifying the position referring to sustainable development implementation



in individual years. SMD values lower than 1 characterise, in terms of sustainable development, the respective situation in particular years:

- <0.0–0.2: very unfavourable,
- <0.2–0.4: unfavourable,
- <0.4–0.6: moderate,
- <0.6–0.8: favourable,
- <0.8–1.0: very favourable.

### 3. Results

This sub-chapter presents research results referring to the sustainable development level of African countries in the years 2002–2016. The values of the synthetic measure of development (SMD), in the discussed years, were determined based on the set of indicators listed in Table 1.

There are 54 independent countries in Africa (Saharawi Arab Democratic Republic is not included in this group as it is essentially a territory of unknown international status, referred to as the so-called state with limited recognition) [58]. Due to extensive data gaps, Libya, Mauritius, São Tomé and Príncipe, Seychelles, Somalia and South Sudan were excluded from the process of aggregate measure construction. Ultimately, therefore, the aggregate measure was developed for 48 African countries (see the list of countries in Table 2). The applied adjustment was adopted for reliability purposes of the scientific research and the credibility of their results. At the same time, the exclusion of the aforementioned countries does not affect significantly the overall results for African countries, as well as the conclusions and recommendations formulated on their basis. Distances from the model and the positions of individual countries in the period 2002–2016 are presented in Table 2.

**Table 2.** SMD value, positions of individual countries and changes in the positions over the selected years in the period 2002–2016.

Country	2002		2007			2012			2016		
	SMD	Position	SMD	Position	Change	SMD	Position	Change	SMD	Position	Change
Algeria	0.3601	42	0.4094	30	12	0.452	20	10	0.4573	25	−5
Angola	0.3456	46	0.3784	43	3	0.3934	44	−1	0.4317	36	8
Benin	0.4454	5	0.4553	9	−4	0.4787	12	−3	0.4888	17	−5
Botswana	0.413	11	0.428	16	−5	0.4784	13	3	0.4948	11	2
Burkina Faso	0.4091	13	0.432	15	−2	0.4663	16	−1	0.4889	16	0
Burundi	0.3809	32	0.408	31	1	0.432	31	0	0.4275	40	−9
Cameroon	0.4031	15	0.4367	13	2	0.4657	17	−4	0.4866	18	−1
Cape Verde	0.4789	1	0.5029	1	0	0.5326	2	−1	0.5295	4	−2
Central African Republic	0.3563	44	0.3473	46	−2	0.3712	47	−1	0.363	47	0
Chad	0.3752	35	0.3385	48	−13	0.3732	45	3	0.3749	45	0
Comoros	0.4223	7	0.4557	8	−1	0.4794	11	−3	0.481	20	−9
Democratic Republic of the Congo	0.3152	48	0.3429	47	1	0.3614	48	−1	0.3721	46	2
Djibouti	0.4012	16	0.4261	22	−6	0.4441	25	−3	0.454	27	−2
Egypt	0.4082	14	0.4221	24	−10	0.4284	35	−11	0.4285	39	−4
Equatorial Guinea	0.3606	41	0.401	34	7	0.4431	26	8	0.4359	34	−8
Eritrea	0.3845	28	0.383	39	−11	0.3729	46	−7	0.3595	48	−2
Ethiopia	0.3505	45	0.3938	36	9	0.4406	29	7	0.494	14	15
Gabon	0.4501	4	0.4546	10	−6	0.4914	8	2	0.5075	5	3
Gambia	0.4132	10	0.4274	17	−7	0.4505	21	−4	0.4528	29	−8

Table 2. Cont.

Country	2002		2007			2012			2016		
	SMD	Position	SMD	Position	Change	SMD	Position	Change	SMD	Position	Change
Ghana	0.4636	2	0.498	2	0	0.5424	1	1	0.5601	1	0
Guinea	0.3865	26	0.3937	37	−11	0.4283	36	1	0.4532	28	8
Guinea-Bissau	0.3968	19	0.4219	25	−6	0.4288	33	−8	0.4426	31	2
Kenya	0.3795	33	0.4143	29	4	0.4475	24	5	0.4735	22	2
Lesotho	0.3737	37	0.3783	44	−7	0.4153	43	1	0.4224	44	−1
Liberia	0.3393	47	0.4274	18	29	0.4286	34	−16	0.4506	30	4
Madagascar	0.3964	20	0.4274	19	1	0.4213	41	−22	0.4286	38	3
Malawi	0.4012	17	0.4571	7	10	0.4966	6	1	0.5047	7	−1
Mali	0.3822	31	0.4189	26	5	0.441	27	−1	0.4643	23	4
Mauritania	0.3848	27	0.3827	40	−13	0.4251	39	1	0.4293	37	2
Morocco	0.4422	6	0.4747	4	2	0.508	4	0	0.5022	8	−4
Mozambique	0.3569	43	0.3735	45	−2	0.43	32	13	0.4261	41	−9
Namibia	0.4175	9	0.444	11	−2	0.4817	10	1	0.4902	15	−5
Niger	0.3751	36	0.3989	35	1	0.4266	38	−3	0.4352	35	3
Nigeria	0.3759	34	0.433	14	20	0.4575	19	−5	0.4786	21	−2
Republic of the Congo	0.3891	23	0.4164	27	−4	0.4495	23	4	0.481	19	4
Rwanda	0.3963	21	0.4594	5	16	0.5121	3	2	0.5414	2	1
Senegal	0.4525	3	0.475	3	0	0.5036	5	−2	0.531	3	2
Sierra Leone	0.3687	38	0.4054	33	5	0.4709	15	18	0.5018	10	5
South Africa	0.3843	29	0.4073	32	−3	0.4408	28	4	0.4258	42	−14
Sudan	0.3674	39	0.3886	38	1	0.4202	42	−4	0.4247	43	−1
Swaziland	0.3627	40	0.3817	41	−1	0.4248	40	1	0.4401	33	7
Tanzania	0.3975	18	0.4421	12	6	0.4714	14	−2	0.4948	12	2
Togo	0.3879	24	0.416	28	−4	0.4334	30	−2	0.4572	26	4
Tunisia	0.4206	8	0.4587	6	2	0.4882	9	−3	0.4943	13	−4
Uganda	0.383	30	0.4272	21	9	0.4498	22	−1	0.461	24	−2
Ivory Coast	0.4101	12	0.4237	23	−11	0.4581	18	5	0.5019	9	9
Zambia	0.3935	22	0.4272	20	2	0.4955	7	13	0.5058	6	1
Zimbabwe	0.3875	25	0.3802	42	−17	0.4275	37	5	0.4409	32	5

Source: authors' compilation based on World Development Indicators. The World Bank DataBank [54].

The values of statistical measures, helpful in interpreting the situation of particular countries and their changes in the analysed years were calculated for the individual years (Table 3).

The situation of African countries in terms of sustainable development level in individual years presented small spatial diversification, as confirmed by the low value of the coefficient of variation. However, this diversification recorded a slight increase, as shown by higher variation indicator in 2016 against 2002 by 1.31%. Each consecutive year, the countries were approaching the model, as evidenced by the systematic increase in the median value along with the minimum value, as well as the increase in the maximum value. A very high value of Pearson's linear correlation coefficient indicates slight changes in the countries' ranking positions in a given year against the previous one. In the situation of a change in the ranking, this change was mostly by one or two positions (up or down).

In 2002, the situation in 31 countries was described as unfavourable, whereas in the remaining ones as moderate. In 2016 the situation was described as unfavourable in 4 and as moderate in 44 countries. It shows that year after year, the number of countries in which the situation regarding the implementation of sustainable development patterns can be referred to as moderate is systematically increasing (Table 4).

**Table 3.** Synthetic measures for the distance from the model in the years 2002–2016.

Specification	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Median	0.3877	0.3972	0.3995	0.4083	0.4159	0.422	0.4264	0.4309	0.4383	0.4384	0.4458	0.4489	0.4544	0.4555	0.4591
Min. value	0.3152	0.3109	0.3238	0.3306	0.3308	0.3385	0.3393	0.3453	0.3565	0.3546	0.3614	0.3558	0.3686	0.3648	0.3595
Max. value	0.4789	0.4868	0.4924	0.4875	0.4957	0.5029	0.5121	0.5121	0.5259	0.5359	0.5424	0.5465	0.5484	0.5588	0.5601
Difference quotient	0.1637	0.176	0.1686	0.1569	0.165	0.1644	0.1729	0.1668	0.1695	0.1813	0.181	0.1907	0.1798	0.1941	0.2007
Coefficient of variation (%)	8.26	9.11	8.75	8.70	8.70	8.60	9.07	8.62	8.43	8.75	8.82	9.19	8.95	9.47	9.58
Arithmetic mean	0.3926	0.3969	0.4032	0.4076	0.4141	0.4187	0.4271	0.4316	0.439	0.4439	0.4496	0.4538	0.46	0.4618	0.4623
Standard deviation	0.0324	0.0361	0.0353	0.0355	0.036	0.036	0.0387	0.0372	0.037	0.0388	0.0396	0.0417	0.0412	0.0438	0.0443
Pearson's linear correlation coefficient (analysed year against the previous year)	-	0.9513	0.9485	0.9778	0.9783	0.9832	0.9842	0.9792	0.9797	0.978	0.9816	0.9875	0.9892	0.9873	0.9858

**Table 4.** The ordering of African countries in terms of the model in the years 2002–2016.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016		
Unfavourable situation	DRC	Liberia	DRC	DRC	Chad	Chad	Chad	Chad	DRC	DRC	DRC	CAR	Eritrea	CAR	Eritrea	Moderate situation	
	Liberia	DRC	Chad	Chad	DRC	DRC	DRC	DRC	Chad	Chad	CAR	DRC	CAR	Eritrea	CAR		
	Angola	CAR	CAR	CAR	CAR	CAR	CAR	CAR	CAR	Eritrea	Eritrea	Eritrea	DRC	DRC	DRC		
	Ethiopia	Chad	Ethiopia	Angola	Angola	Mozambique	Eritrea	Eritrea	Eritrea	CAR	CAR	Chad	Chad	Chad	Chad		
	CAR	Ethiopia	Angola	Lesotho	Lesotho	Lesotho	Mozambique	Mozambique	Mozambique	Angola	Mauritania	Angola	Angola	Sudan	Mozambique		Lesotho
	Mozambique	Mozambique	Mozambique	Mozambique	Mozambique	Angola	Mauritania	Mauritania	Mauritania	Angola	Lesotho	Sudan	Madagascar	Madagascar	Sudan		
	Algeria	South Africa	Lesotho	Ethiopia	Swaziland	Zimbabwe	Lesotho	Lesotho	Mozambique	Egypt	Sudan	Madagascar	Togo	Sudan	South Africa		
	Equatorial Guinea	Angola	Sudan	Sudan	Zimbabwe	Swaziland	Zimbabwe	Guinea	Zimbabwe	Sudan	Madagascar	Mauritania	Zimbabwe	Lesotho	Mozambique		
	Swaziland	Burundi	Swaziland	Swaziland	Eritrea	Mauritania	Swaziland	Zimbabwe	Swaziland	Lesotho	Swaziland	Lesotho	Mozambique	Egypt	Burundi		
	Sudan	Sudan	South Africa	Zimbabwe	Equatorial Guinea	Eritrea	Angola	Swaziland	Lesotho	Zimbabwe	Mauritania	Togo	Lesotho	Mauritania	Egypt		
	Sierra Leone	Swaziland	Eritrea	Equatorial Guinea	Mauritania	Sudan	Guinea	South Africa	Guinea	Guinea	Niger	Zimbabwe	Mauritania	Swaziland	Madagascar		
	Lesotho	Algeria	Niger	Eritrea	South Africa	Guinea	Sudan	Togo	Sudan	Swaziland	Zimbabwe	Egypt	Swaziland	Burundi	Mauritania		
	Niger	Lesotho	Liberia	Niger	Ethiopia	Ethiopia	Ethiopia	Sudan	Kenya	Madagascar	Guinea	Liberia	Burundi	South Africa	Angola		
	Chad	Equatorial Guinea	Burundi	Guinea	Sudan	Niger	Equatorial Guinea	Ethiopia	Togo	Mozambique	Egypt	Guinea-Bissau	Angola	Zimbabwe	Niger		
	Nigeria	Niger	Equatorial Guinea	Republic of the Congo	Guinea	Equatorial Guinea	Togo	Burundi	Madagascar	Ethiopia	Liberia	Niger	Egypt	Niger	Equatorial Guinea		
	Kenya	Eritrea	Zimbabwe	Liberia	Niger	Sierra Leone	Burundi	Niger	South Africa	Burundi	Guinea-Bissau	Swaziland	Niger	Equatorial Guinea	Swaziland		
	Burundi	Zimbabwe	Nigeria	Mauritania	Republic of the Congo	South Africa	Niger	Kenya	Ethiopia	Niger	Mozambique	Mozambique	Guinea	Guinea-Bissau	Zimbabwe		
	Mali	Nigeria	Guinea	Sierra Leone	Sierra Leone	Burundi	South Africa	Egypt	Burundi	Togo	Burundi	Guinea	Guinea-Bissau	Togo	Guinea-Bissau		
	Uganda	Sierra Leone	Mauritania	Nigeria	Togo	Algeria	Sierra Leone	Angola	Niger	Equatorial Guinea	Togo	Burundi	Djibouti	Djibouti	Liberia		
	South Africa	Uganda	Sierra Leone	Algeria	Kenya	Kenya	Kenya	Republic of the Congo	Egypt	South Africa	Ethiopia	Mali	Liberia	Angola	Gambia		
Eritrea	Kenya	Algeria	South Africa	Algeria	Togo	Republic of the Congo	Madagascar	Djibouti	Djibouti	South Africa	Equatorial Guinea	South Africa	Guinea	Guinea			
Mauritania	Guinea	Kenya	Kenya	Mali	Republic of the Congo	Algeria	Sierra Leone	Republic of the Congo	Republic of the Congo	Mali	South Africa	Equatorial Guinea	Liberia	Djibouti			
Guinea	Mauritania	Mali	Mali	Egypt	Mali	Liberia	Liberia	Guinea-Bissau	Liberia	Equatorial Guinea	Djibouti	Gambia	Gambia	Togo			
Zimbabwe	Guinea-Bissau	Uganda	Uganda	Liberia	Guinea-Bissau	Egypt	Guinea-Bissau	Mali	Guinea-Bissau	Djibouti	Gambia	Uganda	Uganda	Algeria			
Togo	Tanzania	Republic of the Congo	Burundi	Djibouti	Egypt	Guinea-Bissau	Djibouti	Liberia	Ivory Coast	Kenya	Ethiopia	Mali	Algeria	Uganda			
Republic of the Congo	Egypt	Guinea-Bissau	Togo	Ivory Coast	Ivory Coast	Djibouti	Mali	Equatorial Guinea	Kenya	Republic of the Congo	Uganda	Ethiopia	Mali	Mali			

Table 4. Cont.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
Unfavourable situation	Zambia	Mali	Togo	Guinea-Bissau	Uganda	Djibouti	Ivory Coast	Ivory Coast	Algeria	Gambia	Uganda	Kenya	Kenya	Kenya	Kenya	Moderate situation
	Rwanda	Zambia	Zambia	Egypt	Guinea-Bissau	Uganda	Mali	Algeria	Ivory Coast	Mali	Gambia	Nigeria	Algeria	Nigeria	Nigeria	
	Madagascar	Republic of the Congo	Egypt	Djibouti	Nigeria	Zambia	Madagascar	Equatorial Guinea	Sierra Leone	Algeria	Algeria	Algeria	Burkina Faso	Burkina Faso	Comoros	
	Guinea-Bissau	Madagascar	Tanzania	Ivory Coast	Madagascar	Madagascar	Uganda	Uganda	Nigeria	Uganda	Nigeria	Cameroon	Nigeria	Cameroon	Republic of the Congo	
	Tanzania	Botswana	Ivory Coast	Zambia	Zambia	Liberia	Gambia	Tanzania	Uganda	Burkina Faso	Ivory Coast	Republic of the Congo	Sierra Leone	Ethiopia	Cameroon	
Malawi	Togo	Djibouti	Madagascar	Burundi	Gambia	Nigeria	Nigeria	Gambia	Nigeria	Cameroon	Sierra Leone	Cameroon	Sierra Leone	Benin		
Djibouti	Malawi	Madagascar	Tanzania	Cameroon	Botswana	Cameroon	Gambia	Botswana	Cameroon	Burkina Faso	Tanzania	Republic of the Congo	Comoros	Burkina Faso		
Cameroon	Cameroon	Cameroon	Cameroon	Botswana	Burkina Faso	Zambia	Cameroon	Cameroon	Tanzania	Sierra Leone	Ivory Coast	Tanzania	Tanzania	Namibia		
Egypt	Ivory Coast	Rwanda	Botswana	Gambia	Nigeria	Tanzania	Botswana	Burkina Faso	Benin	Tanzania	Benin	Ivory Coast	Benin	Ethiopia		
Burkina Faso	Djibouti	Botswana	Rwanda	Tanzania	Cameroon	Namibia	Burkina Faso	Tanzania	Botswana	Botswana	Comoros	Comoros	Republic of the Congo	Tunisia		
Ivory Coast	Rwanda	Burkina Faso	Malawi	Burkina Faso	Tanzania	Burkina Faso	Zambia	Zambia	Zambia	Benin	Burkina Faso	Botswana	Ivory Coast	Tanzania		
Botswana	Namibia	Namibia	Gambia	Namibia	Namibia	Botswana	Namibia	Benin	Sierra Leone	Comoros	Namibia	Benin	Botswana	Botswana		
Gambia	Burkina Faso	Malawi	Burkina Faso	Benin	Gabon	Gabon	Comoros	Namibia	Namibia	Namibia	Botswana	Namibia	Tunisia	Sierra Leone		
Namibia	Gambia	Comoros	Namibia	Comoros	Benin	Comoros	Benin	Comoros	Tunisia	Tunisia	Tunisia	Tunisia	Malawi	Ivory Coast		
Tunisia	Comoros	Gambia	Comoros	Malawi	Comoros	Benin	Gabon	Tunisia	Comoros	Gabon	Malawi	Malawi	Gabon	Morocco		
Comoros	Tunisia	Tunisia	Gabon	Rwanda	Malawi	Rwanda	Tunisia	Gabon	Gabon	Zambia	Zambia	Zambia	Zambia	Malawi		
Morocco	Benin	Benin	Tunisia	Gabon	Tunisia	Malawi	Malawi	Malawi	Senegal	Malawi	Senegal	Gabon	Morocco	Zambia		
Benin	Gabon	Gabon	Benin	Tunisia	Rwanda	Tunisia	Rwanda	Rwanda	Malawi	Senegal	Gabon	Morocco	Namibia	Gabon		
Gabon	Morocco	Morocco	Morocco	Morocco	Morocco	Morocco	Morocco	Senegal	Rwanda	Morocco	Morocco	Senegal	Senegal	Cape Verde		
Senegal	Ghana	Senegal	Senegal	Senegal	Senegal	Senegal	Senegal	Morocco	Morocco	Rwanda	Rwanda	Rwanda	Rwanda	Senegal		
Ghana	Senegal	Ghana	Ghana	Ghana	Ghana	Ghana	Cape Verde	Cape Verde	Cape Verde	Cape Verde	Cape Verde	Cape Verde	Cape Verde	Rwanda		
Cape Verde	Cape Verde	Cape Verde	Cape Verde	Cape Verde	Cape Verde	Cape Verde	Ghana	Cape Verde	Ghana	Ghana	Ghana	Ghana	Ghana	Ghana		

Source: authors' compilation. DRC–Democratic Republic of Congo, CAR–Central African Republic, red colour – unfavourable situation, yellow colour – moderate situation.

In 2002, 2004, 2005 and 2010–2012 the lowest ranking position was taken by the Democratic Republic of the Congo. In 2003, Liberia was ranked the lowest. Chad took the last place in 2006–2009. The Central African Republic occupied the last position in 2013 and 2015. In 2014 and 2016, the worst situation was recorded in Eritrea. In 2002–2007 and in 2009, Cape Verde was ranked the highest and in the other years it was Ghana.

#### 4. Discussion

The analysis of individual indicator values selected for the study allows for putting forward the following conclusions. In 2002–2003, the highest GDP per capita (current US\$) was recorded in Gabon, and in the subsequent years, in Equatorial Guinea, whereas the lowest one was in Ethiopia in 2002, and in the following years, in Burundi. The indicator value showed extensive differences between the individual countries. The gradually, year by year, increasing minimum value is a positive phenomenon. At the same time, however, the maximum value kept going up, which resulted in the increasing difference between the poorest and the richest countries. The difference level is shown by comparing the indicator value in 2007, when it was more than 90 times higher in the Equatorial Guinea than in Burundi, and in 2016, when this value was “only” 30 times higher.

The analysed countries were also characterised by extensive differences in terms of the foreign direct investment, net inflation (Balance of Payments (BoP), current US\$) indicator. The countries presenting the lowest indicator value were as follows: Angola, Benin, Chad, Democratic Republic of the Congo, Equatorial Guinea, Gambia and Swaziland. The highest values were recorded in Egypt, Nigeria and South Africa. The value of total unemployment (% of total labour force) indicated quite large differences between the individual countries. This diversification remains at the same level throughout the analysed period. Its lowest value (except 2003 and 2008) was recorded in Benin and in the other two years in Rwanda. The worst situation occurred in Gambia in 2002–2003 and 2009–2016, and also in Lesotho in 2004–2008. In these countries, every third working-age resident was unemployed.

The analysed African countries showed large differences in terms of arable land (% of land area). This diversification remained at the same level throughout the entire studied period. This was largely due to the specificity of African countries. The lowest share, not exceeding 1%, was recorded in Djibouti, which is a desert and semi-desert country. The highest indicator value ranging between 38% and 49% was recorded in Rwanda and Togo. The basis of Rwanda’s economy is agriculture, which produces about 40% of the country’s GDP. Bananas, sweet potatoes, cassava, sorghum and potatoes are grown there. This country is an exporter of coffee beans, tea, tobacco, cotton and pyrethrum. Agriculture is also the basis of the economy in the case of Togo, as it is responsible for about 1/3 of GDP and offers employment to approx. 70% of the working-age population. Manioc, jams, rice, maize, sorghum and millet are produced to satisfy the nutritional needs of the country, whereas coffee, cotton and peanuts are produced for export.

A significant diversification was also observed regarding the access to electricity (% of population). However, these differences were systematically reduced, which is a positive trend. Another positive phenomenon was the continuously increasing minimum value and the shrinking difference between the maximum and the minimum value. The best situation in terms of access to electricity occurred in Algeria, Egypt, Morocco and Tunisia, whereas the worst was in Liberia in 2002–2011 and in the following years in Burundi.

Small diversification was recorded in terms of the Crop production index (2004–2006 = 100), which, however, showed an upward trend in the analysed period. For each consecutive year, both minimum and maximum values systematically grew, which is the reason for the increasing diversification. Eritrea was the country characterised by the lowest value of the indicator in the years 2002–2004, 2008–2010, and 2015–2016. In the remaining years the lowest value was recorded in Botswana (2013), Gambia (2007, 2011, 2014), Lesotho (2012), Malawi (2005) and Senegal (2006). The best situation occurred in Angola (2009–2011, 2013), Chad (2012), Eritrea (2005), Lesotho (2002), Malawi (2006, 2007), Mauritania (2014, 2015), Niger (2008, 2016), Tunisia (2003) and Zimbabwe (2004).

The analysed countries showed virtually no diversification in terms of individuals using the Internet (% of population). The growing average value of this indicator is a positive phenomenon. In 2002, it was 1%, whereas in 2016, it was over 21%. The situation was the worst in Liberia (2002–2006), Sierra Leone (2007–2010) and Eritrea (2011–2016). The best situation was recorded in South Africa (2002–2003), Egypt (2004) and Morocco (2006–2016).

African countries were highly diversified in terms of their youth unemployment rate (% of total labour force ages 15–24) (modelled ILO estimate). This diversification increased in the period under analysis. The lowest share of unemployed youth was recorded in Benin, except for 2003 and 2008 when the lowest value occurred in Rwanda. The highest share exceeding 50% was recorded in South Africa (2002–2005) and Swaziland (2006–2016). Average diversification could be observed between individual countries in terms of crude birth rate (per 1000 people). The lowest indicator value throughout the entire analysed period occurred in Tunisia, and the highest was in Niger. It should be emphasized that a higher indicator value had a positive impact on the implementation of sustainable development patterns. Taking into account the problem of African continent overpopulation, this indicator shows live births, the increase of which is positive given that stillbirths are the problem of many African countries. Higher number of live births may, therefore, result from medical progress or the improvement of medical care offered to pregnant women. It will also contribute to the increasing generational replacement, which is very important considering the problem of population aging.

The indicator regarding population ages 65 and above (% of total) was characterised by average diversification. The indicator presented the lowest value in 2002–2005 in Sierra Leone, and in the subsequent years in Uganda. The highest value, in the entire studied period, was recorded in Togo. It is worth noting that due to the relatively short life expectancy, the average share of people aged 65 and more in the analysed countries presented a level of 3.5%. The studied countries differed, to a small extent only, in terms of age dependency ratio (% of working-age population). The lowest value of the indicator in the entire analysed period was recorded in Tunisia, whereas the highest was in 2002–2007 in Uganda and in the subsequent years in Nigeria.

Africa is the continent with the highest number of HIV infected people (approx. 24.9 million, i.e., approx. 64,3% infected worldwide). The value analysis of the total prevalence of HIV (% of population 15–49) shows high diversification between the individual countries, which keeps advancing year after year. The countries characterised by the lowest value of this indicator were: Algeria, Comoros, Egypt, Morocco, Sudan and Tunisia. In turn, the highest value was recorded in Swaziland. In the latter country, the indicator value was almost 30 times higher than the countries recording its lowest value.

The African continent is also characterised by the lowest value of total life expectancy at birth. However, the systematically increasing value of this indicator is a positive phenomenon. The average value for 2002 was slightly less than 54 years of age, and in 2016, it went up to over 62 years. The diversification between individual countries was small and, year by year, showed a declining trend. The lowest value occurred in Sierra Leone in 2002–2007 and 2016 and in the Central African Republic in 2008–2015, whereas the highest was in Tunisia (2002–2010) and next in Algeria (2011–2016).

The infant mortality rate (per 1000 live births) indicator was highly diversified. This diversification decreased slightly in the analysed period. The declining maximum values indicated a positive trend. The lowest value was recorded in Tunisia. The highest value occurred in Sierra Leone in 2002–2011, to be followed by the Central African Republic (2012–2016). The value of the total health expenditure (% of GDP) indicator shows average diversification, which increased slightly in the analysed period. The decreasing minimum value in the studied period is a negative phenomenon. In 2002–2007, the lowest value was recorded in the Equatorial Guinea, in 2008–2011 in the Democratic Republic of the Congo, in 2012–2013 in Eritrea, in 2014 in Madagascar, and in 2015–2016 in Chad. The highest share of expenditure on health in GDP was recorded in Sierra Leone (2002–2005, 2011, 2013), Burundi (2006), Liberia (2007–2010), and Malawi (2012, 2014–2016).

African countries are not diversified in terms of CO<sub>2</sub> emissions (kg per 2010 US\$ of GDP). The minimum value in all analysed years was recorded in Chad, whereas the maximum one was in

South Africa. The analysed countries presented average diversification in terms of renewable energy consumption (% of total final energy consumption). This diversification, in the period under analysis, remained on the same level. In each of the studied years, the lowest indicator value occurred in Algeria. The share of renewable energy in none of the analysed years exceeded 0.5% in this country. This stands out against the others as the next in line country featuring the lowest share of renewable energy was Egypt with the share exceeding 5%. In turn, the largest share was recorded in the Democratic Republic of the Congo, as it reached over 92%. The value for Burundi presented a similar level. The total greenhouse gas emissions (kt of CO<sub>2</sub> equivalent) indicator showed very small diversification. The lowest value was recorded in Cape Verde for the entire analysed period, whereas the highest was in the Democratic Republic of the Congo. The steadily increasing, year after year, average value is a negative phenomenon, which reflects the increasing general level of emissions.

The analysed countries are also diversified, to a small extent, regarding CO<sub>2</sub> emissions from liquid fuel consumption (kt). The lowest value, in each of the analysed years, was recorded in Comoros, and the highest in Egypt. The average value systematically increased each consecutive year, which should be assessed negatively. A very small diversification can be observed in terms of the death rate due to road traffic injuries per 100,000 population. In each of the analysed years, the minimum value was recorded in Egypt. The maximum value occurred in South Africa in 2002–2006, whereas in 2007–2011 and 2014–2016, this occurred in the Democratic Republic of the Congo and in 2012–2013 in Malawi.

The forest area (% of land area) indicator showed a large diversification in individual countries. The minimum value, not exceeding 0.1% was recorded in Egypt. In turn, over 85% of Gabon was covered by moist forests. In this country, vegetation cover is dense and its growth is fast. Tropical rain forests predominate and as much as 20 percent of the local plant species can be found nowhere else on the earth. Forest rents (% of GDP) indicator also showed an extensive diversification. However, this diversification was systematically declining and, in the analysed period, decreased by over 24 percentage points. The lowest value was recorded in Sudan in 2002–2010, and in subsequent years in Algeria. The maximum value occurred in Liberia.

African countries presented an average diversification level in terms of people using basic drinking water services (% of population). This diversification was systematically declining in the analysed period. Eritrea recorded the minimum value in the entire discussed period. The positive trend is, however, shown by the continuously increasing minimum value. In the studied period, the increase amounted to over 2 percentage points. The maximum value of over 98% was recorded in Egypt.

The analysed countries were diversified, to a very large extent, in terms of their total natural resources rents (% of GDP). However, this diversification declined by more than 38 percentage points over the analysed period. The minimum value, in all analysed years, occurred in Togo. The countries where the highest values were recorded are: Angola, the Democratic Republic of the Congo, Equatorial Guinea, Liberia and Mauritius.

Import value (2000 = 100) indicator was characterised by a small degree of diversification. The minimum value occurred in Liberia in 2002–2012 and in subsequent years in Swaziland. The maximum value was recorded in Chad in 2002–2004, in Sudan in 2005–2006, in Equatorial Guinea in 2007–2012, in the Democratic Republic of the Congo in 2013–2014 and next in Ethiopia in 2015–2016. The imports of goods and services (% of GDP) indicator showed average diversification, which in the period under analysis, decreased by over 16 percentage points. The countries where the lowest value was recorded are Nigeria and Sudan. The maximum value occurred in Lesotho and Liberia.

The improved water source (% of population with access) indicator showed low diversification. This diversification also reduced during the considered period. The minimum value occurred in Ethiopia in 2002–2009, in the following year in Madagascar, in 2011 in Angola and in 2012–2016 in Equatorial Guinea. The systematically increasing minimum value is a positive phenomenon. The maximum value occurred in Egypt throughout the entire examined period.



In each of the analysed years, the lowest value of the voice and accountability indicator occurred in Eritrea. The highest was recorded in Cape Verde in 2002 and in 2006–2016, in Botswana in 2003–2004, to be followed by South Africa in 2005. In the case of the rule of law indicator, the lowest value was recorded in Liberia in 2002, in Zimbabwe in 2003–2011, in the Democratic Republic of the Congo in 2012 and next in the Central African Republic from 2013–2016. The highest value occurred in Botswana, except for 2006 and 2014, when Cape Verde was the leader in this respect. The countries with the lowest control of corruption indicator were Angola, Chad, the Democratic Republic of the Congo, Guinea-Bissau, Nigeria, Sudan and Zimbabwe. The highest value was recorded in Botswana in 2002–2014, followed by Cape Verde in 2015–2016.

## 5. Conclusions and Future Recommendations for African Countries in the Context of Sustainable Development

The general conclusion is that the situation of African countries, in terms of sustainable development level, has improved quite significantly in the analysed years. It is a clearly positive phenomenon; however, the problem is that Africa generally features a low development level. Positive changes observed in individual countries occurred within the range: unfavorable situation to moderate situation. No country has, so far, recorded a favorable situation in accordance with the adopted research methodology, not to mention a very favorable one. Nonetheless, the trend remains positive as African countries are aware of the importance of sustainable development and the related objectives to be achieved.

The listed problems result partly from the previously carried out analyses and research. In addition, they were selected based on the critical analysis of the subject literature. For each identified order, the sub-area of sustainable development, the goals that seem to be important for Africa in the years to come were selected and recommended. For the purposes of this subsection, the key of two problems identified for each area was adopted. There were several dozen, if not several hundred problems related to Africa, thus it is impossible to describe them all within the framework of a single scientific article. Five orders were distinguished, i.e., social, economic, environmental, spatial, and institutional and political, altogether co-creating a relatively developed form of an integrated order.

Integrated order is, in this case, approached as the benchmark essence of sustainable development, as a positive target state of development changes, which combines the previously mentioned integral orders in a coherent manner. The minimum axiological threshold for these orders' development is characterised by, at least, moderate anthropocentrism. It should be noted that the indications for identifying and considering sustainable development as an integrated order may vary depending on the field and discipline of science [11].

The suggested recommendations for the future (Table 5) can be approached as signposts providing food for thought. Africa faces numerous problems, and it is difficult to list and describe them all. They have been relatively well-reflected in the goals of the Agenda 2063, identified on their basis. As in the case of other similar initiatives, consistency in action, financial resources and the consensus of most African countries remain crucial in achieving success. Such a transparent approach of the African continent towards the principles and concepts of sustainable development is, however, optimistic for the future. The results of indicators-based research can provide useful knowledge for people and institutions responsible for the sustainable development processes, i.e., government administration representatives, business world representatives, non-governmental organizations and science. In this sense, the carried-out studies and their results may contribute to the improvement of the situation on the continent.

**Table 5.** Future recommendations for African countries.

Sustainable Development Orders	Problem	Recommendation, Potential Solutions to the Identified Problem
Social	Lack of universal access to education	Tens of millions of children in Africa, predominantly girls, still do not have access to basic education levels. The number of teachers is also insufficient. The solution to this situation, apart from the obvious financial support, may be the volunteer network expansion, with particular emphasis on students from the developed countries. Such process will also support the formation of the new generation of local education sector employees.
	Large number of people infected with HIV, other diseases	African countries are still facing the problem of the HIV/AIDS plague spreading, as well as malaria and non-infectious diseases such as cancer, diabetes and cardiovascular diseases. In the context of the HIV virus, the recommendation is education, dissemination of knowledge about the ways of contracting infection and the methods of preventing it. The same refers to other health problems, their prevention and education. The scale of the problem is too large to be solved through ad hoc financial support.
Economic	Decline in the number of tourists	In the case of European countries, the tourism sector is a nice addition to an overall balance of the economy. In terms of African countries, this sector cannot be overestimated, especially the northern part of the continent. A smaller number of tourists results primarily from the past terrorist attacks. By all means, the level of security should be much higher, which is largely a local problem, and as such, external observers will not be of much help here. In addition, visitors must be convinced that the authorities of African countries are doing absolutely everything in their power to counteract terrorism. Beyond any doubt, it is a process that takes time. It can, obviously, be observed that tourism also has a negative impact on sustainable development (e.g. increased emission of pollutants). Nevertheless, in the current situation of Africa, there are more arguments (economic ones) for the positive impact of tourism sector.
	Poor condition of the industry sector	The main African industries, i.e., manufacturing, mining and construction are in poor condition. This is reflected, e.g., in the share of industry in exports. These sectors employ only a dozen or so percent of employees on the entire continent. It is worth noting here that in developed countries, the respective percentage amounts to approx. 70%. At this point, the development distance of Africa to the most developed countries is clearly visible. It is recommended to intensify the activities aimed at attracting foreign investors. It is also vital to develop the system of concessions, reliefs or investment incentives and take advantage of the support provided by external experts.
Environmental	Lack of access to drinking water	Africa is a dry continent, only Australia suffers a worse situation in this respect. Uneven distribution of water is one of the major problems. Almost half of the water resources are located in the central part of the continent, with only trace amounts available in the north. In turn, there is much better infrastructure for the distribution of drinking water in the north. There are basically two recommendations. Collection of rainwater, which theoretically could be enough even for half of the continent's population. The second solution is related to the development of technical infrastructure, supported by an aid scheme provided by the developed countries. Sea water desalination can also be recommended; however, it is a less effective option in terms of costs.
	Climate change	The problems regarding climate change on the continent are mainly related to a smaller amount of rainfall, higher temperatures, floods and the spread of diseases related to floods, such as cholera. In this case, not everything depends on the African countries, who are responsible only for a few percent of the total carbon dioxide emissions. Actually, Africa suffers the consequences not being responsible itself for the greenhouse gas emissions. The recommendation is to convince and raise awareness of foreign partners, especially the developed countries, about their potentially harmful actions.

Table 5. Cont.

Sustainable Development Orders	Problem	Recommendation, Potential Solutions to the Identified Problem
Spatial	Ecological degradation of space	The African continent loses millions of hectares of forests each year, approximately twice as much as the deforestation average in the world. The agricultural areas recovered in this way becomes degraded after a relatively short period of time; therefore it is just an apparent advantage. In addition, there is the problem of rapid urbanization and habitat destruction of many species. In this case it is recommended to consistently enforce and observe the respective legal regulations, and moreover, as in the case of diseases, education with particular emphasis on the importance of ecology in the development of space.
	Spatial irregularity in access to energy	Out of all people worldwide, who do not have access to electricity, more than one third live in Sub-Saharan Africa. Furthermore, Africa, which produces approx. 7% of the world's energy, uses only 3%. Energy is, therefore, consumed in other areas and the population of the continent does not have access to it. The process of energy distribution in the continent has to be improved; the expenditure, including external funds, on expanding the technical infrastructure should be higher. In the long run, increasing the renewable energy share in total energy consumption should be considered.
Institutional-political	Limited role of women in public life	Despite signing further agreements to promote women's rights in many African countries, they are still not respected. Moreover, the standards in everyday treatment of women are frequently different from the ones followed, e.g., the European countries. Women have limited access to public debate and to expressing their opinions. In this area, it is recommended to gradually increase the role of women in public life, with particular emphasis on political positions, where their standpoint will be more powerful.
	Limited extent of institutional correlations	In most cases, African countries are not institutionally correlated. Obviously, there are organizations functioning on the continent and certain initiatives are taken up to support more extensive partnerships; however, they are not comparable to other solutions worldwide, not to mention the European Union. As a result, the voice of African countries is less powerful and thus overcoming further problems becomes more difficult. It is recommended to strengthen cooperation, e.g., within the framework of the African Union (AU), to work out a consensus on the future development directions for the continent, taking into account the goals and importance of sustainable development.

Source: authors' compilation based on References [59–64].

## 6. Further Research Directions

The discussed issues are fascinating as much as demanding and complicated. The problems encountered by the authors refer to, e.g., access to reliable data and their comparison possibility within a given period of time. As of today, the World Bank database seems the best source of information for both researchers and business practitioners. Permanent monitoring of the changing position of African countries in the context of sustainable development level, i.e., de facto repeating the conducted research, or the application of a different research methodology, can be mentioned among the research directions for the future. The results obtained in this way will allow for putting forward new conclusions and taking a specific retrospection.

The second direction of the research to be carried out can take the form of an attempt to compare the position of African countries against other continents or a group of countries. For example, the problems and development opportunities resulting from the implementation of sustainable development in different parts of the world could be compared within the framework of such research. This approach will lay the foundation for the practical application of the research results. The third research trend may focus on the extended analyses covering the African continent, comparing the individual sustainable development indicators, developing a book of good practices and the memorable history of successful projects.

Moreover, from the perspective of assessing sustainable development implementation on the African continent, an attempt of evaluating its implementation in the countries where it has not yet been possible due to the absence of available data seems an important challenge. Analysing the situation in these countries will facilitate obtaining a more complete picture of the situation in Africa in the future.

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