

Abstract

The development of Africa including industrialization such as chemical production, urbanization, agriculture, waste disposal, and electric power generation has a direct and diverse effect on the environment. These activities require effective planning, consultation, evaluation, risk assessment and monitoring techniques. Diverse environmental impacts can arise out of planning, construction, operation, and end-life of such activities. Impacts of global climate change, photochemical smog, and radioactive emissions have a direct link to development projects. Nevertheless, there is intensive research and innovation geared towards integrating development activities and the environment so as to achieve sustainable development. Herein, we review some of the technological innovation breakthroughs in various fields that include the built environment, chemical production, toxicants, municipal wastes, and electricity. The concept of sustainable chemistry is also discussed. It is found that Africa is at an advantage towards achieving sustainable development as it can easily adopt refined technological tools from developed countries. For instance, the use of comprehensive strategic environmental assessment tools for proposed policies plans and programs and environmental impact assessment for projects can see Africa achieve sustainable development. Mitigation measures for problems such as hazardous waste from chemical industries can be minimized using technological tools such as incineration of solid wastes, biological treatment of wastewater, batch and semi-batch conventional distillation, entrainer-based distillation, physical adsorption, and extraction etc. However, it is noted that although Africa should adopt some of these technological tools to help accelerate its sustainable development agenda, regional and cultural differences must be incorporated in the adoption process.

Graphical abstract

The current industrialization endeavor by African countries can escalate the present environmental degradation processes such as global climate change, species extinction, eutrophication, waste generation, social stratification, harmful radiations, power struggles, and catastrophes. It is, therefore, necessary for these countries to include sustainable development concept which delivers both social and economic development without compromising environmental quality. There are robust technological innovations that are able to mitigate these problems such as CO₂ sequestration using polyoxometalate inorganic salts. This review article discusses these innovation tools.

