Property development amidst global warming and climatic change: A review[1]

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Abstract

Property development otherwise referred to as real estate development or investment appears to be facing challenges in recent times due to the effects of the twin challenges of global warming and climatic change. No thanks to man's activities on land and exploration to natural resources. Exploration of natural resources and human activities have continued to impact the ecosystem which has created great concerns. This paper reviewed literature on property development amidst global warming and climate change. A number of issues were raised including concern about how investors' confidence can further be secured on real estate development. With the above mind, there are initiatives to reduce the impact of flooding and other weather events via incorporation of green infrastructure and storm water management, build resilient structures that can withstand extreme weather events, incorporate green spaces into the landscape, conduct risk assessments, create emergency plans, build infrastructure that can withstand extreme weather events, use recycled materials, utilize green spaces, and minimize disruption of natural habitats to reduce the impact of development on the environment, use drought-tolerant landscaping, and incorporate green infrastructure such as rain gardens.

Keywords: *Climatic change, Development, Global warming, Land and Property*

1.0 Introduction

Land which has been described by various authors has several meanings to different professionals and individuals alike. Land is believed to provide the principal basis as a source of human livelihoods as well as well-being which include the supply of food, freshwater and multiple other ecosystem services, as well as biodiversity, IPCC, (2019). Additionally, according to IPCC, (2019), man's use of land is believed to affect directly more than 70% (likely 69-76%) of what is termed global, ice-free land surface (that is of high confidence). Land also is believed to be playing a critical role in the climate system. Land is seen as a source of both a sink of greenhouse gases (GHGs) and as well as playing an important role in the energy exchange, water and aerosols

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between the land surface and atmosphere, land ecosystems and biodiversity are endangered to ongoing climate change and weather as well extreme climate, to various extents, IPCC, (2019).

Land under which a property is developed or will be developed needs a proper or holistic approach to its management which is seen must be sustainable especially in this era of climate change and global warming. Sustainable land management will aid in reducing the defeatist effects of multiple stressors, which include climate change, on ecosystems and societies (high confidence), IPCC, (2019).

Climate change has the potential to drastically affect property development in many ways. Warmer temperatures can lead to increased flooding, sea level rise, and other extreme weather events. These events can damage infrastructure, decrease the amount of usable land for development, and increase the cost of construction due to rising materials costs. Warmer temperatures can also cause a decrease in air quality, leading to more health problems for occupants of the property. Additionally, the increased risk of natural disasters may lead to more stringent building codes and regulations, which could increase the cost of development and limit the types of projects that can be undertaken. Finally, changing climate patterns can also lead to a decrease in demand for certain types of properties, such as those located in coastal areas that are particularly at risk of flooding or sea level rise.

Property development is the process of improving land or existing buildings to increase its value and make it suitable for new uses. It is a process which deals with substituting or strengthening the use of land with the intent of producing buildings for occupation, Wilkinson and Reed, (2008). Property development includes constructing new buildings and renovating existing ones, as well as landscaping, urban planning, and other activities. Developers may specialize in residential, commercial, or industrial properties, or may work on multiple types of properties. The goal of property development is to create a space that meets the needs of its users in terms of function, aesthetics, and cost. Property development can have a direct effect on global warming and climatic change. When land is developed for homes, businesses, and infrastructure, it increases the amount of impervious surfaces like asphalt and concrete, which absorb and trap heat from the sun. This can contribute to an increase in local temperatures, which can lead to further global warming and climatic change. In addition, when land is developed, the natural vegetation that helps to absorb carbon dioxide is disrupted, and this can also contribute to global warming and climatic change.

In response to global warming and climatic change, property developers must focus on eco-friendly and sustainable construction practices. This includes using renewable energy sources such as solar power, wind energy, and biofuels to reduce greenhouse gas emissions. Developers should also consider using green building materials such as recycled materials, bamboo, and cork. In addition, implementing energy efficient building systems such as high-efficiency HVAC systems, efficient lighting, and energy-efficient appliances can help reduce energy consumption.

Furthermore, utilizing green roofing, rainwater harvesting, and xeriscaping can help reduce water consumption and improve water quality. Lastly, developers should encourage their tenants to use green lifestyle practices such as recycling, composting, and efficient water use.

With the above in mind, this paper reviews the issues on property development especially as it concerns the global warming and climate with a view to further creating awareness on same and how investment in property can be secured.

2.0 Literature Review

Property development

Property development is a business that involves the acquisition, renovation, and leasing or sale of properties. It involves a wide range of activities including the purchase of land, financing, construction, marketing, and legal aspects. Property developers typically work with architects, engineers, and contractors to develop a project from inception to completion. They may also provide guidance to tenants in order to ensure their needs are met and the property is maintained to a high standard. Property development is a long-term investment that can be very profitable, but it also carries a high level of risk.

Property development is a term used to refer to the process of improving land or buildings to increase its value and potentially generate income. This typically involves the acquisition of land, financing, planning, design, construction, marketing, and management of the entire process. It is a complex and multi-faceted process, requiring a variety of skills and expertise to ensure success. Property developers need to be aware of zoning laws and regulations, understand the local market, and be able to negotiate contracts for the best possible terms. Property development can be used for residential, commercial, industrial, or any other type of property.

Property development appears to have varied meaning and may depend on respective authors or discipline approach to same. According to Chitsulo, (2015); To an Architect, it is the shaping of the built environment for commercial gain a swell as finding the delicate balance between good design and the commercial imperative; to the Town Planner, it is the delivery and management of places for people to live, work, shop and play and from Entrepreneurs perspective; it is process of improving the usefulness of land or building through the development of facilities that meet social, commercial and infrastructural needs and turning dreams into reality

Climate change

The United Nations Framework Convention on Climate Change, UNFCCC, (2005) defines climate change" as „...a change of climate which is attributed directly or indirectly to human [anthropogenic] activity that alters the global atmosphere composition and natural climate variability that has been observed over comparable time periods.

Climate change is the long-term alteration in average weather patterns that can have a wide range of impacts on the environment and on society. It is caused by increases in the average temperature of the Earth's atmosphere and oceans, largely due to the increase of greenhouse gases produced by human activities, such as burning fossil fuels, deforestation, and agricultural activities. The consequences of climate change can include rising sea levels, melting glaciers and ice sheets, more frequent and intense extreme weather events, and changes in the frequency and distribution of plants and animals. These changes can have serious impacts on human health, food security, water resources, and coastal infrastructure. Efforts to mitigate and adapt to climate change are essential to reducing the impacts of this phenomenon.

Climate change is the long-term alteration in global or regional climates that results from increased levels of carbon dioxide and other greenhouse gases in the atmosphere. Climate change is caused by human activities, such as burning fossil fuels, deforestation, and agriculture, which produce higher concentrations of greenhouse gases. As the concentration of greenhouse gases in the atmosphere increases, more heat is trapped, leading to changes in global climate patterns. These changes can include increases in average temperatures, increases in extreme weather events, changes in precipitation patterns, and rising sea levels. Climate change can also have an impact on ecosystems, leading to species extinction, changes in habitats, and shifts in the food supply.

Climate change is the long-term alteration of average weather patterns across the world. It is caused by the release of greenhouse gases into the atmosphere, which trap heat and cause the temperature of the Earth to rise. Climate change is already having an impact on the planet, causing an increase in severe weather events, more frequent droughts and floods, ocean acidification, and other disruptions to the global climate. Reducing emissions of greenhouse gases is one of the most important steps that can be taken to slow climate change.

Global warming

Warming has resulted in an increased frequency, intensity and duration of heat related events, including heat waves14 in most land regions (high confidence). The prevalence and severity of droughts increased drastically in many regions which include; the Mediterranean, west Asia, many parts of South America, much of Africa, and north-eastern Asia) (medium confidence), an increased prevalence of heavy precipitation events has been witnessed at a global scale (medium confidence), IPCC, (2019).

Global warming is a term used to describe the recent and ongoing rise in global average temperature. Scientists believe that human activities, such as burning fossil fuels, are the primary cause of this increase in temperature. The consequences of global warming include extreme weather events, sea level rise, and species extinction. Global warming is one of the most pressing

environmental issues of our time, and governments, businesses, and citizens must work together to reduce its impacts.

Global warming has resulted to great switch of climate zones in many world regions, this includes the expansion of arid climate zones and for polar climate zones (high confidence) there has been contraction, the resultant effect is that many plant and animal species experienced drastic changes in their ranges, abundances, and switch in their seasonal activities (high confidence), IPCC, (2019).

Global warming is said to be long-term rise in what is supposed to be the normal temperature of the Earth's climate system. It is a major aspect of climate change/swap and has been exemplified by direct temperature measurements as well measuring the various effects of the warming. The term refers to the human-caused/induced observed warming since pre-industrial times and its continued projection, it worthy to note also that there has been earlier notification on global warming. Today, global warming and climate change are used interchangeably. Global warming is the resultant effect of continued emissions of carbon dioxide and other greenhouse gases into the atmosphere. The primary source of these emissions is the burning of fossil fuels, such as coal, oil and natural gas, which release carbon dioxide when combusted.

Property development and climate change

The development of property and climate change is closely linked as the development of property often requires the use of resources that can increase carbon emissions and contribute to global warming. This is especially true of new construction projects, which require building materials, transportation, and energy to power the development. It is important for property developers to consider the environmental impact of their development and work to reduce their carbon footprint. This can include using renewable energy sources, such as solar and wind, as well as investing in energy-efficient building materials, such as recycled steel and recycled wood products. Additionally, developers should look for ways to reduce the amount of water used in construction and look for ways to capture and reuse rainwater. Finally, developers should look for ways to reduce the emissions of their construction equipment and vehicles.

Climate change poses a significant challenge to the global property development sector. As the climate is changing, it is becoming increasingly important for developers to factor in natural disasters, such as floods, extreme weather events, and sea-level rise, when constructing new buildings and planning for the future. In addition to natural disasters, rising temperatures and changing precipitation patterns can have a negative impact on the quality of buildings and their lifespan. To mitigate these risks, property developers are increasingly incorporating green building technologies, such as green roofs and solar panels, into their designs to reduce energy consumption and increase the resilience of their structures. In addition, developers are considering

more sustainable materials and construction practices to reduce their environmental footprint and help ensure that their buildings can withstand the impacts of climate change.

Property development can be seen as real estate, however in relation to climate change; real estate climate change adaptation covers not only the adaptation of buildings, infrastructure, and urban space, Wieteska-Rosiak (2020). It also embraces a resilient construction sector and its supply chains. Small and medium-sized enterprises should as a matter serious concern strengthens their resilience to distortions to ensure continuity of their operations and market competitiveness (Gayan et al., 2010; Wieteska, 2016).

Literature sources argue that climate change consequences continue to be seen as sources of low risk on the real estate market, Wieteska-Rosiak, (2020). According to him it is vital to specify the role and importance of the real estate sector in the climate change adaptation policy. The major adaptation measures together with sectors and areas vulnerable to climate change including:

1. The construction sector – to foster its resilience, natural hazards should be considered while designing foundations and trusses or technical installations, e.g., the sewage system.

2. The spatial economy and urbanised areas – it is recommended, inter alia, to: work out rules for the construction of buildings in areas threatened by climate change but also for green areas in cities and on the coastline; organise consultancy for investors in threatened areas; make local development plans available online; impose limits for construction projects and additional requirements linked with the protection of buildings against flooding in floodplains and in coastal zones.

Also, the most frequent effects of climate change observed in literatures in the real estate sector include the damage to technical infrastructure as a result of increased risk, flooding, urban floods, and lacking continuity of water supply. Developers must explore ways to integrate climate change adaptation strategies into their plans to ensure that their projects are resilient in the face of climate change.

Property development and global warming

As agents of planetary change, humans play a significant role in the processes responsible for climate change, Babie, (2010). Global warming is a key issue when considering property development. As the climate changes and temperatures rise, the risks associated with certain types of development increase. For example, coastal development is becoming increasingly risky due to the potential for flooding and erosion associated with rising sea levels. Property developers must take into account the potential impacts of global warming when considering new projects, such as selecting building materials that are designed to be more resilient to extreme weather

events. Additionally, green infrastructure and technologies, such as green roofs and solar panel arrays, can be incorporated into new developments to reduce their environmental footprint and help mitigate the effects of climate change.

There has been suggestion that the processes of anthropogenic (or human induced) climate change deals with a sophisticated interplay of man's activities especially the preserve of individual disciplines, including ecology, climatology, economics, anthropology, psychology, political science, philosophy, and neuroscience, Roling, (2009). The development of real estate can have a significant impact on global warming. While new construction can improve the local environment, it also requires the use of resources and energy, which can contribute to the emission of greenhouse gases. Building materials, construction equipment, and transportation associated with real estate development all contribute to greenhouse gas emissions. Furthermore, the use of electricity and other energy sources for heating, cooling, and lighting in real estate can also add to the problem. Real estate developers can take measures to reduce the environmental impact of their projects. This includes using renewable energy sources, such as solar and wind energy, as well as incorporating energy-efficient construction materials and appliances. Developers can also work with local and state governments to promote green building standards, such as LEED certification, which encourages the use of sustainable building practices. In addition, developers can work to reduce the amount of water and materials used in their projects. Finally, developers should strive to incorporate green spaces into their developments, such as green roofs, urban gardens, and parks. These green spaces can help to mitigate the effects of global warming by providing carbon sinks and cooling the atmosphere.

3.0 Property development amidst global warming and climate change

The development of real estate appears to be seen as becoming increasingly complex as global warming and climate change are having a greater impact on our environment. Property developers must now consider the potential impacts of these trends when making decisions. Climate change can impact the physical environment, making some areas more susceptible to flooding or drought. In addition, rising temperatures can cause more frequent and intense storms, making it more difficult to build and maintain structures. According to Wade, (2022) more extreme weather has the potential to weaken economic growth through damage to the capital stock and labor supply, and labor productivity will weaken as the world economy adjusts to higher temperatures. Wade added that Inflation will increase courtesy of the growing cost of food, energy and insurance. He further stated that monetary policy will be limited as it attempts to combat the stagflationary pressures of climate change. Property developers should consider ways to mitigate the effects of climate change. For example, they may choose to build on higher ground to reduce the risk of flooding or use green building materials to reduce energy consumption and emissions. Developers may also consider ways to provide additional green space and reduce their overall carbon footprint.

The global climate is changing, and this will have a significant impact on the real estate sector. Property developers need to be aware of the risks posed by climate change and take steps to mitigate them. One of the main challenges is increasing temperatures, which can cause buildings to overheat and become uncomfortable for occupants. Developers should consider installing insulation, passive cooling systems, and other energy-efficiency measures to help reduce the risk of overheating in their projects. Developers should also be aware of the potential impact of rising sea levels and storm surges on waterfront properties. Consideration should be given to raising the ground level of new developments to help protect them from flooding.

Baldauf, Garlappi and Yannelis (2020) argued that real estate is arguably the ideal asset class to address this question. It long-duration nature exposes it to the type of long-run risks that emanate from climate change. It is by far the most important asset for the majority of households: the current homeownership rate is 63.6% (U.S. Census Bureau 2017). Asset holding in residential property for and average household stood at holds 40%, in contrast to 30.5% which was invested in financial assets (SCF 2013). More so it is seen as an important source of household debt, adding to its relevance in the overall economy. Scientific projections indicate that climate change will lead to a rise in the global sea level and that this will affect the coastal regions in the United States over the coming decades. This is not limited to America as it has been witnessed in Delta State areas of Nigeria.

The development of property amidst global warming and climatic change presents numerous challenges. Developers must consider the effects of climate change on their projects and plan accordingly. This includes incorporating sustainable design strategies and materials that reduce energy consumption, increase water efficiency, and reduce the impact on the natural environment. Other strategies include the use of green roofs, rainwater harvesting, and solar power. Additionally, developers must consider the impacts of flooding, sea level rise, and extreme weather events when planning for the development of property. They must ensure that the design and construction of the project are resilient and able to withstand the effects of climate change.

In the face of global warming and climatic change, property development can be a difficult task. Developers must take into account the increased risk of extreme weather events and how to mitigate against them in order to protect their investments. One way to do this is to design buildings and infrastructure with climate change in mind. This includes using materials that are less prone to damage from flooding, heat, or strong winds, or using designs that are more resilient to the effects of climate change. Developers should also consider strategies to reduce the energy use of their buildings, such as using renewable energy sources and energy-efficient building designs. In addition, developers should consider the effects of sea-level rise and coastal erosion when constructing buildings near the coast. This may involve elevating the design of the building or constructing protective barriers to prevent flooding.

Climate change and global warming have caused a variety of issues, including rising sea levels, shifting weather patterns, and extreme weather events. The impacts of climate change pose threats to the social, economic and environmental dimensions of sustainable development in almost all countries, mitigation of climate change and adaptation polices have an impact on other sustainable development goals, and progress towards achieving other sustainable development goals can contribute to both climate change mitigation and adaptation, UN Department of economic and Social Welfare, (2008). Property developers must be aware of these issues when planning development projects. To mitigate the impact of climate change, developers should consider using renewable energy sources, such as solar and wind, to power developments. Additionally, they should consider using sustainable building materials, such as recycled materials, to reduce the carbon footprint of their projects. Developers should also consider implementing green infrastructure and landscaping, such as green roofs, rain gardens, and permeable pavement, to help mitigate the effects of extreme weather events, such as flooding and heat waves.

In response to global warming and climatic change, sustainable property development strategies should be implemented. These strategies should include energy efficient building design and construction techniques, the use of renewable energy sources, the reduction of waste and water consumption, and the promotion of green spaces. To reduce energy consumption, property developers should incorporate passive design strategies such as natural lighting and ventilation, as well as utilize efficient heating and cooling systems. Furthermore, green roofs, solar panels, and other renewable energy technologies should also be considered. Developers should also strive to reduce water consumption by utilizing low flow fixtures, water saving landscaping techniques, and rainwater harvesting systems.

4.0 Conclusion and Recommendation

While we are faced with serious effects of the climate change and global warming, their impact on property development is huge. To secure investors' confidence in the real estate sector – property development there certain points that must be noted and taken into consideration. They include the following:

There is need for developers as a matter of necessity incorporate green infrastructure and storm water management strategies that reduce the impact of flooding and other weather events.

Developers should look for ways to build resilient structures that can withstand extreme weather events, such as strong winds or heavy rains. By taking these steps, developers can ensure the sustainability of their development and help protect our environment.

Green spaces should be incorporated into the landscape in order to provide natural cooling, absorb carbon dioxide, and reduce air pollution.

Developers should consider the potential impacts of climate change on the local environment and population and develop appropriate plans to prepare for potential changes. This includes conducting risk assessments, creating emergency plans, and building infrastructure that can withstand extreme weather events.

Developers should as a matter of concern consider ways to reduce the impact of their development on the environment. This can include using recycled materials, utilizing green spaces, and minimizing disruption of natural habitats.

There should be awareness on the potential impacts of extreme weather events such as droughts and floods on their projects. By using drought-tolerant landscaping and incorporating green infrastructure such as rain gardens, developers can help mitigate the risk of damage from extreme weather.

5.0 References

Barbie, P. (2010). Climate Change and the Concept of Private Property. Retrieved from https://www.researchgate.net/publication/228210966_Climate_Change_and_the_Concept_of_Private_Property

British Institute of International and Comparative Law, (2016). What Role Do Property Rights Play In Climate Change? Retrieved from https://www.biicl.org/documents/62_6493_biicl_climate_change_and_property_rights_-_seminar_report.pdf

Chitsulo, H. (2015). Introduction to property development: entrepreneur empowerment property fund. Retrieved from https://gpf.org.za/wp-content/uploads/2018/05/PropDevEEPFP2.pdf

Intergovernmental Panel on Climate Change (IPCC), (2019). Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.-O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)]. In press. Retrieved from https://www.ipcc.ch/site/assets/uploads/2019/11/SRCCL-Full-Report-Compiled-191128.pdf

UN Department of economic and Social Welfare, (2008). Climate change in national sustainable development strategies – common practices. Retrieved from https://www.un.org/esa/sustdev/csd/csd16/documents/bp12_2008.pdf

United Nations Environment Programme UNEP, (2009). Buildings and climate change: summary for climate change. Retrieved from https://www.uncclearn.org/wp-content/uploads/library/unep207.pdf

United Nations Framework Convention on Climate Change, (2006). Retrieved from http://unfccc.int/essential_background/convention/background/items/1349.php

UN-OHRLLS (2009). The impact of climate change on the development prospects of the least developed countries and small island developing states. Retrieved from https://www.un.org/ohrlls/sites/www.un.org.ohrlls/files/the_impact_of_cc_on_ldcs_and_sids_for_web.pdf

Vally Koubi ETH Zurich and University of Bern (N.D.). Sustainable development impacts of climate change and natural disaster. Retrieved from https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/publication/SDO_BP_Koubi.pdf

Wade, K. (2022). The impact of climate change on the global economy. Retrieved from https://prod.schroders.com/en/sysglobalassets/digital/us/pdfs/the-impact-of-climate-change.pdf

Wieteska-Rosiak, B. (2020). Real estate sector in the face of climate change adaptation in major polish cities. R*eal Estate Management and Valuation*, 28(1), 51-63. **DOI**: https://doi.org/10.2478/remav-2020-0005

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