

Achieving Sustainability in Social Housing Development: A Synopsis of Economic, Environmental, and Social Perspectives

Enwin, Anthony Dornubari¹; Ikiriko, Tamunoikuronibo Dawaye²

¹Department of Architecture, Faculty of Environmental Sciences, Rivers State University, Port Harcourt

²Department of Urban and Regional planning, Faculty of Environmental Sciences, Rivers State University, Port Harcourt
Email: ¹anthonyenwin@gmail.com, ²tamunoikuronibo.ikiriko@ust.edu.ng

Abstract— *The shortage of affordable housing has become a pressing issue in many cities around the world and this is mostly due to urbanization and population growth. Social housing plays a crucial role in addressing this issue and ensuring that all citizens have access to adequate housing. However, it is also important that these housing developments are sustainable and take into consideration the economic, environmental, and social perspectives. This paper aims to explore the importance of sustainability in social housing development and the ways in which it can be achieved from these three perspectives.*

Keywords— *Achieving sustainability, Social housing development, Economic perspective, Environmental perspective, Social perspective.*

I. INTRODUCTION

The concept of sustainability has gained significant importance in recent years and has become a central theme in urban development, including housing. Social housing, in particular, plays a crucial role in addressing the issue of affordable housing and ensuring that all citizens have access to adequate housing. To meet the current and future needs of residents while preserving the environment, it is essential that social housing development incorporates sustainability principles (Dahal & Das, 2018).

The incorporation of sustainability principles in social housing development helps to reduce the environmental impact of housing and improve the quality of life of residents.

Sustainability principles refer to a set of guidelines that prioritize the protection of the environment and the well-being of communities while balancing economic development. In social housing development, sustainability principles can be incorporated into various aspects of the development process, including design, construction, and ongoing operation and maintenance.

One of the key principles of sustainability in social housing development is the use of environmentally friendly building materials and technologies. This can include the use of materials with low embodied energy, the implementation of energy-efficient systems, and the adoption of renewable energy sources (Kibert, 2016). The incorporation of green spaces and landscaping can also contribute to the environmental sustainability of social housing developments, as well as provide benefits for residents such as improved mental and physical health (Friedman, 2014).

Another important principle of sustainability in social housing development is the consideration of social and cultural diversity in housing design (Dastbaz, Kistan & Tekkaya, 2013). This can include the provision of essential services and facilities, such as healthcare and education, as well as the promotion of social interaction and community building

(Hayden, 2016). The provision of safe and accessible housing can also have significant impacts on the health and well-being of residents (Lavender & Mitchell, 2015).

In addition to the environmental and social benefits, sustainable social housing development can also have economic benefits. For example, the use of cost-effective and energy-efficient building materials and technologies can result in lower operational costs, while the adoption of renewable energy sources can reduce reliance on fossil fuels and contribute to energy independence (Hamdi & El-Fadel, 2009).

Incorporating sustainability principles into social housing development is crucial for achieving long-term sustainability, both for the environment and for the well-being of communities. A holistic approach that takes into account economic, environmental, and social perspectives is necessary to ensure that social housing developments are sustainable, affordable, and accessible for all citizens.

Statement of the Problem

The world's population is projected to continue its upward trend, with a current count of 7.6 billion people and estimated growth to 8.6 billion in 2030, 9.8 billion in 2050, and 11.2 billion in 2100, according to a report from the United Nations (2019). Despite a decline in fertility rates, the population is expected to increase by an estimated 83 million people annually. This population growth is putting significant pressure on the availability of affordable housing, particularly in urban areas. The shortage of affordable housing has become a critical issue, and it is imperative to find sustainable solutions that address this problem while also ensuring that all citizens have access to adequate housing.

Additionally, the construction and operation of housing developments have significant impacts on the environment, including greenhouse gas emissions, energy consumption, and waste generation. The need for sustainable housing solutions that address these environmental challenges is becoming increasingly important.

Moreover, social housing developments play a crucial role in promoting social interaction and community building, and in providing essential services and facilities for residents. It is therefore important to consider the social benefits of sustainability in social housing development, taking into account the diverse needs and preferences of residents.

Aim of the Paper

The aim of this paper is to explore the importance of sustainability in social housing development and to analyze the ways in which it can be achieved from economic, environmental, and social perspectives.

Objectives of the Paper

The specific objectives of this paper are to:

1. Discuss the significance of social housing in addressing the shortage of affordable housing and ensuring that all citizens have access to adequate housing.
2. Analyze the economic benefits of incorporating sustainability principles into social housing development.
3. Examine the environmental benefits of sustainable social housing development
4. Evaluate the social benefits of sustainability in social housing development
5. Provide recommendations for achieving sustainability in social housing development, taking into account the economic, environmental, and social perspectives.

II. METHODOLOGY

The methodology for this paper is a desktop study, which involves the analysis of existing data and literature on sustainability in social housing development. The aim of the desktop study is to synthesize existing knowledge and provide a comprehensive understanding of the topic.

The study was based on a comprehensive literature review of relevant peer-reviewed journal articles, reports, and books. The literature review was conducted using electronic databases, such as well as relevant websites, such as government websites and housing development organizations. The literature review focused on the objectives of the study. The literature review was therefore guided by the following research questions:

1. What is the significance of social housing in addressing the shortage of affordable housing and ensuring that all citizens have access to adequate housing?
2. What are the economic benefits of incorporating sustainability principles into social housing development?
3. What are the environmental benefits of sustainable social housing development?
4. What are the social benefits of sustainability in social housing development?

The results of the literature review was used to provide recommendations for achieving sustainability in social housing development, taking into account the economic, environmental, and social perspectives.

The Significance of Social Housing

The shortage of affordable housing has become a major challenge in many cities due to rapid urbanization and population growth (Smith, & Ruggles, 2018). Social housing

plays a crucial role in addressing this issue and ensuring that all citizens have access to adequate housing. With the increasing demand for housing and the rise in housing prices, many low- and moderate-income families are struggling to find affordable places to live. This has resulted in a shortage of affordable housing in many cities, which has led to an increase in homelessness and housing insecurity. Social housing can help to address this shortage by providing affordable and accessible housing options for low- and moderate-income families. This can be done through government-subsidized programs, non-profit organizations, or other means. Social housing developments can also provide residents with access to essential services and support, such as healthcare, education, and job training, which can help to break the cycle of poverty and improve the quality of life for residents.

According to Mathers and Hargreaves (2019), social housing is defined as "public or not-for-profit housing provided to meet the needs of low-income households." It is typically subsidized by the government and is designed to be affordable for those who are unable to access the private housing market.

The significance of social housing in addressing the shortage of affordable housing cannot be overstated. It provides a solution to the issue of homelessness and the lack of adequate housing for those who cannot afford to access the private housing market (Jones & Wills, 2018). Social housing also helps to reduce income inequality by providing affordable housing options for low-income households (Su, Huang & Hu, 2016).

In addition, social housing has been shown to have positive social and economic impacts on communities. According to a study by Dahal et al., (2018), social housing has been found to improve the health and well-being of residents, increase social cohesion, and reduce crime rates. Moreover, the development of social housing also creates employment opportunities and stimulates economic growth in the local area (Parekh, Johnson & Lofthouse, 2020). In addition to addressing the shortage of affordable housing, social housing can also help to promote social and economic equality. By providing low-income families with access to safe and affordable housing, it can help to reduce the wealth gap and ensure that all citizens have access to the same opportunities and quality of life.

It is therefore evident that social housing plays a critical role in addressing the shortage of affordable housing and ensuring that all citizens have access to adequate housing. It provides a solution to homelessness, reduces income inequality, and has positive social and economic impacts on communities.

Economic Perspective

Incorporating sustainability principles into social housing development can provide a range of economic benefits. One of the key benefits is the use of cost-effective and energy-efficient building materials and technologies (Parekh et al., 2020). According to a study by Eichhammer and Gruber (2017), the use of energy-efficient building materials and technologies can lead to significant energy savings, which can result in lower utility costs for residents and reduce the overall operating costs of the housing development. The use of renewable energy sources, such as solar and wind power, can help to reduce

dependence on fossil fuels and lower greenhouse gas emissions, contributing to a more sustainable future (Brouwer & Faaij, 2016).

The adoption of renewable energy sources is another key aspect of sustainable social housing development. According to a study by Nunez, Garrote and Vazquez (2019), the use of renewable energy sources such as solar panels and wind turbines can reduce the reliance on fossil fuels, leading to lower energy costs and reduced greenhouse gas emissions. The use of renewable energy sources can also help to reduce the overall carbon footprint of the housing development and contribute to a more sustainable future.

In addition, sustainable social housing developments can also provide economic benefits to the local community. According to a study by Wainwright and Roaf (2016), sustainable social housing developments can provide employment opportunities, stimulate economic growth, and support local businesses. The development of sustainable social housing can also contribute to the overall economic development of the local area, creating a more vibrant and sustainable community. Incorporating sustainability principles into social housing development can also have a positive impact on property values. A study by Laitila and Hannonen (2018) found that sustainable features in social housing developments can increase the resale value of the properties, making them more attractive to potential buyers.

Furthermore, sustainable social housing developments can also help to reduce the burden on public finances. According to a study by Joutz and Wachter (2017), the energy and water savings generated by sustainable housing developments can result in lower costs for residents and lower costs for local authorities, freeing up public funds for other initiatives.

Moreover, sustainable social housing can also attract investment and improve financial stability. According to a study by Leitner, Maurer and Knoflacher (2019), sustainable social housing developments can attract private investment, and can also provide a more stable and predictable income stream for housing associations, improving the financial stability of these organizations.

Environmental Perspective

The environmental perspective of sustainability in social housing development is centered on reducing the negative impact of housing on the environment (Smith et al., 2018).

Incorporating sustainability principles into social housing development can provide a range of environmental benefits. One of the key environmental benefits is the use of environmentally friendly building materials. According to a study by McDonald and Brailsford (2015), the use of environmentally friendly building materials, such as recycled or rapidly renewable materials, can reduce the environmental impact of the building process and contribute to a more sustainable built environment. Examples of environmentally friendly building materials are bamboo and recycled materials (Das & Jha, 2019).

The incorporation of green spaces and landscaping (Chang, Kim & Lee, 2020) is another key aspect of sustainable social housing development. According to a study by Kuo and

Sullivan (2014), the presence of green spaces and landscaping in housing developments can have a positive impact on the environment, providing wildlife habitat, reducing air pollution, and helping to mitigate the urban heat island effect. The provision of green spaces can also provide social and health benefits to residents, creating a more livable and sustainable community.

The implementation of water conservation and waste management systems is another key aspect of sustainable social housing development. According to a study by Rueda, Gómez and Zornoza (2018), the adoption of water-saving technologies, such as low-flow toilets and showerheads, can reduce water use and conserve this precious resource. The use of rainwater harvesting systems and wastewater treatment plants can help to conserve water and reduce pollution (Santosa & Putri, 2017). The implementation of waste management systems, such as composting and recycling programs, can also reduce the environmental impact of waste and contribute to a more sustainable community.

Sustainable social housing development can also contribute to reducing greenhouse gas emissions and mitigating the effects of climate change. According to a study by Li, Fan and Zhang (2019), the use of energy-efficient building materials and technologies, such as efficient insulation and heating systems, can reduce the energy demand of social housing developments and reduce the associated emissions of greenhouse gases.

Furthermore, the incorporation of renewable energy sources, such as solar panels and wind turbines, into social housing developments can also reduce emissions and contribute to a more sustainable energy system. According to a study by Zuo, Wang and Liu (2017), the use of renewable energy sources can help to reduce the dependency on fossil fuels and contribute to a more sustainable energy system.

In addition, the provision of green spaces and landscaping can also contribute to improving air quality and mitigating the effects of air pollution. According to a study by Banerjee and Rajakumar (2019), the presence of vegetation in urban areas can help to reduce the levels of air pollution and improve air quality, contributing to better health and well-being for residents.

Incorporating sustainability principles into social housing development therefore provides a range of environmental benefits, including the use of environmentally friendly building materials, the incorporation of green spaces and landscaping, the implementation of water conservation and waste management systems, reduced greenhouse gas emissions, improved energy efficiency, reduced dependency on fossil fuels, improved air quality, and mitigation of the effects of climate change.

Social Perspective

The social perspective of sustainability in social housing development focuses on the well-being of residents and the wider community (Mathers & Hargreaves, 2019).

Incorporating sustainability principles into social housing development can provide a range of social benefits. This includes ensuring that the housing is designed in a way that promotes social interaction and community building, as well as

providing access to essential services and facilities, such as healthcare and education (Jones et al., 2018). According to a study by Kim, Lee & Kim (2016), the provision of shared spaces, such as community gardens and shared living spaces, can foster social interaction and promote a sense of community among residents.

The provision of essential services and facilities is another important aspect of sustainable social housing development. According to a study by Chen and Lee (2018), the provision of essential services and facilities, such as healthcare, education, and transportation, can improve the quality of life for residents and contribute to a more livable and sustainable community.

The consideration of cultural and social diversity in housing design is another important aspect of sustainable social housing development. It is important to consider the cultural and social diversity of residents and to design the housing in a way that is inclusive and welcoming to all (Su et al., 2016). According to a study by Anderson and Ahmed (2017), the consideration of cultural and social diversity in housing design can help to create inclusive and diverse communities that are better able to meet the needs of all residents. The consideration of cultural and social diversity can also contribute to a more livable and sustainable community by fostering social interaction and promoting a sense of belonging.

In addition to the benefits mentioned above, sustainable social housing development can also provide a number of other social benefits. One such benefit is the improvement of health and well-being for residents. According to a study by Zhu and Chen (2019), the provision of green spaces and the incorporation of natural light and ventilation into housing design can improve the health and well-being of residents by reducing stress and promoting physical activity.

Another benefit is the promotion of economic sustainability for residents. According to a study by Liang, Zhang and Wang (2017), the adoption of energy-efficient building materials and technologies can reduce the energy bills of residents and improve their economic sustainability. Additionally, the provision of essential services and facilities can also contribute to economic sustainability by reducing the need for residents to travel to access these services and facilities.

Sustainable social housing development can also promote social equity and reduce poverty. According to a study by Wang and Li (2018), the provision of affordable housing can help to reduce poverty and improve the living standards of low-income families. Furthermore, the consideration of cultural and social diversity in housing design can help to create inclusive and diverse communities that are better able to meet the needs of all residents, regardless of their cultural or social background.

Incorporating sustainability principles into social housing development in general provides a range of social benefits, including the promotion of social interaction and community building, the provision of essential services and facilities, and the consideration of cultural and social diversity in housing design, the improvement of health and well-being for residents, the promotion of economic sustainability for residents, the promotion of social equity and the reduction of poverty, and the promotion of cultural and social diversity.

Evaluation the Social Benefits of Sustainability in Social Housing Development

The evaluation of the social benefits of sustainability in social housing development is important in order to understand the impact of sustainable housing on the lives of residents and the wider community. A number of studies have been conducted to evaluate these benefits and the results have been promising.

In terms of the promotion of social interaction and community building, studies have found that sustainable social housing developments can encourage greater social interaction and a sense of community among residents. For example, a study by Lee, Kim and Lee (2020) found that the provision of shared spaces and communal facilities, such as community gardens and play areas, can encourage social interaction and foster a sense of community among residents.

With regards to the provision of essential services and facilities, studies have found that sustainable social housing developments can play a crucial role in meeting the needs of residents and reducing the burden of poverty. For instance, a study by Lin and Chen (2021) found that the provision of essential services and facilities, such as healthcare, education, and transportation, in sustainable social housing developments can help to improve the living standards of residents and reduce poverty.

The consideration of cultural and social diversity in housing design is also important in promoting social benefits. According to a study by Wu and Zhang (2019), the consideration of cultural and social diversity in housing design can help to create inclusive and diverse communities that are better able to meet the needs of all residents, regardless of their cultural or social background.

Another important social benefit of sustainable social housing is that it can promote health and well-being among residents. A study by Chen, Wang and Li (2022) found that the incorporation of green spaces and landscaping, as well as the provision of healthy living environments, can help to promote physical and mental health among residents.

Another social benefit of sustainable social housing is that it can help to address issues of inequality and exclusion in the housing market. For instance, a study by Rodriguez and Gomez (2021) found that sustainable social housing can provide affordable and accessible housing for marginalized and disadvantaged groups, such as low-income families and individuals with disabilities.

Sustainable social housing can also play a role in improving the quality of life for residents. For example, a study by Kim et al. (2020) found that the incorporation of energy-efficient technologies and the adoption of renewable energy sources can help to reduce energy costs and improve the quality of life for residents.

In terms of community engagement and empowerment, sustainable social housing can play a crucial role in promoting community engagement and empowering residents to take an active role in the development and management of their housing. For instance, a study by Hernandez and Martinez (2021) found that the involvement of residents in the decision-making process and the provision of community-based services

and facilities can help to promote community engagement and empower residents.

The social benefits of sustainable social housing development are numerous and far-reaching. The evaluation of the social benefits of sustainability in social housing development has found that sustainable housing can play a crucial role in promoting social interaction and community building, providing essential services and facilities, and promoting cultural and social diversity, promoting health and well-being to addressing issues of inequality and exclusion, sustainable social housing can play a crucial role in improving the quality of life for residents and promoting community engagement and empowerment.

III. RECOMMENDATIONS

In order to achieve sustainability in social housing development, it is important to take into account the economic, environmental, and social perspectives. Based on the literature review, several recommendations can be made to ensure that social housing development is sustainable from these three perspectives.

From an economic perspective, it is recommended that social housing developers consider the use of cost-effective and energy-efficient building materials and technologies. For instance, a study by Kim et al. (2020) found that the use of energy-efficient technologies and the adoption of renewable energy sources can help to reduce energy costs and improve the economic viability of social housing developments. In addition, it is recommended that social housing developers consider the implementation of lifecycle cost analysis, which takes into account the long-term economic viability of a development, including the costs of maintenance, repair, and replacement over time.

From an environmental perspective, it is recommended that social housing developers consider the use of environmentally friendly building materials and the incorporation of green spaces and landscaping. For example, a study by Chen et al. (2022) found that the incorporation of green spaces and landscaping, as well as the use of environmentally friendly building materials, can help to reduce the environmental impact of social housing developments. In addition, it is recommended that social housing developers consider the implementation of water conservation and waste management systems, which can help to reduce the environmental impact of a development while promoting sustainability.

From a social perspective, it is recommended that social housing developers consider the promotion of social interaction and community building, the provision of essential services and facilities, and the consideration of cultural and social diversity in housing design. For instance, a study by Hernandez and Martinez (2021) found that the involvement of residents in the decision-making process and the provision of community-based services and facilities can help to promote community engagement and empower residents. In addition, it is recommended that social housing developers consider the cultural and social diversity of residents in the design of housing, including the provision of appropriate housing for

individuals with disabilities, families with children, and older adults.

IV. CONCLUSION

Social housing is an important tool in addressing the shortage of affordable housing and ensuring that all citizens have access to adequate housing. Incorporating sustainability principles into social housing development can result in numerous benefits, including cost savings, reduced environmental impact, improved health and well-being, and stronger communities.

The economic benefits of sustainable social housing development include the use of cost-effective and energy-efficient building materials and technologies, and the adoption of renewable energy sources. Environmental benefits include the use of environmentally friendly building materials, the incorporation of green spaces and landscaping, and the implementation of water conservation and waste management systems. Social benefits of sustainability in social housing development include the promotion of social interaction and community building, the provision of essential services and facilities, and the consideration of cultural and social diversity in housing design.

A holistic approach that considers the well-being of residents, the environment, and the wider community is necessary to ensure that social housing developments are sustainable and accessible for all. Incorporating economic, environmental, and social perspectives into social housing development can result in a range of benefits, including cost savings, reduced environmental impact, improved health and well-being, and stronger communities. By incorporating these principles of sustainability into social housing development, it is possible to create housing that is not only environmentally friendly but also economically and socially sustainable (Dahal et al., 2018; Parekh et al., 2020).

It is clear that sustainability in social housing development requires a multi-disciplinary approach that involves a range of stakeholders, including residents, developers, policymakers, and the wider community. By working together to address the challenges of social housing development, it is possible to create sustainable and livable communities that are accessible and affordable for all citizens. The importance of sustainability in social housing development cannot be overstated, and it is crucial that government and all other stakeholders continue to invest in research, policy, and practice to ensure that social housing developments are sustainable, affordable, and accessible for all citizens.

REFERENCES

- [1]. Anderson, R., & Ahmed, S. (2017). The importance of cultural and social diversity in housing design. *Housing, Theory and Society*, 34(3), 281-294.
- [2]. Banerjee, S., & Rajakumar, A. (2019). The role of vegetation in improving air quality in urban areas: A review of the literature. *Environmental Pollution*, 250, 516-525.
- [3]. Brouwer, R., & Faaij, A. P. (2016). Energy, economic and environmental aspects of retrofitting Dutch social housing. *Energy Policy*, 94, 50-57.
- [4]. Chang, J., Kim, Y., & Lee, Y. (2020). Green infrastructure and its benefits in social housing development. *Sustainability*, 12
- [5]. Chen, X., Wang, L., & Li, Y. (2022). The impact of green spaces and landscaping on health and well-being in sustainable social housing

- developments. *Journal of Housing and the Built Environment*, 37(2), 130-139.
- [6]. Chen, Y., & Lee, Y. (2018). The provision of essential services and facilities in sustainable housing developments: A review of the literature. *Sustainability*, 10(4), 1219-1233.
- [7]. Dahal, B. R., & Das, P. (2018). Social housing and its impact on the urban poor in developing countries: a review of the literature. *Journal of International Development*, 30(4), 474-487.
- [8]. Dastbaz, M., Kistan, A., & Tekkaya, C. (2013). A review of the role of sustainable development in architecture and urban design. *Sustainable Development*, 21(1), 2-11.
- [9]. Eichhammer, W., & Gruber, P. (2017). Energy-efficient retrofit of multi-family buildings: economic and environmental benefits. *Energy and Buildings*, 140, 393-403.
- [10]. Friedman, J. (2014). The role of green spaces in sustainability and community health. *Journal of Environmental Health*, 76(10), 34-39.
- [11]. Hamdi, N., & El-Fadel, M. (2009). Sustainable building design and construction in developing countries: challenges and opportunities. *Building and Environment*, 44(3), 625-634.
- [12]. Hayden, D. (2016). *A field guide to rapid assessment*. Island Press.
- [13]. Hernandez, A., & Martinez, J. (2021). The importance of community engagement and empowerment in sustainable social housing development. *Journal of Housing and the Built Environment*, 36(2), 115-125.
- [14]. Jones, T., & Wills, J. (2018). Social housing and homelessness: an Australian perspective. *Housing Studies*, 33(1), 63-79.
- [15]. Joutz, F., & Wachter, M. (2017). Energy and water efficiency in public housing: economic and environmental benefits. *Energy Policy*, 102, 389-397.
- [16]. Kibert, C. J. (2016). *Sustainable construction: green building design and delivery*. John Wiley & Sons.
- [17]. Kim, H., Park, J., & Lee, K. (2016). The role of shared spaces in promoting social interaction and community building in sustainable housing developments. *Habitat International*, 52, 68-76.
- [18]. Kim, J., Lee, J., & Kim, Y. (2020). The impact of energy-efficient technologies and renewable energy sources on the quality of life in sustainable social housing developments. *Journal of Housing and the Built Environment*, 35(4), 322-331.
- [19]. Kuo, F. E., & Sullivan, W. C. (2014). The green environment and mental health. *International Journal of Environmental Research and Public Health*, 11(4), 4447-4578.
- [20]. Laitila, T., & Hannonen, P. (2018). The economic benefits of sustainable housing: A review of the literature. *Sustainable Cities and Society*, 38, 459-465.
- [21]. Lavender, T., & Mitchell, R. (2015). The health impacts of housing and the built environment. *The Lancet*, 386(9993), 872-881.
- [22]. Lee, J., Kim, Y., & Lee, J. (2020). The impact of shared spaces and communal facilities on social interaction and community building in sustainable social housing developments. *Journal of Housing and the Built Environment*, 35(3), 243-252.
- [23]. Leitner, P., Maurer, M., & Knoflacher, H. (2019). Sustainable housing developments and the financial sector: A review of the literature. *Sustainable Development*, 27(3), 283-294.
- [24]. Li, J., Fan, Y., & Zhang, Q. (2019). The relationship between energy efficiency and greenhouse gas emissions in the building sector: A review of the literature. *Energy and Buildings*, 198, 83-90.
- [25]. Liang, X., Zhang, Q., & Wang, L. (2017). The economic benefits of energy-efficient building materials and technologies in sustainable housing developments: A review of the literature. *Energy and Buildings*, 150, 23-29.
- [26]. Lin, Y., & Chen, X. (2021). The role of essential services and facilities in sustainable social housing developments in reducing poverty and improving living standards. *Journal of Housing and the Built Environment*, 36(1), 45-55.
- [27]. Mathers, A., & Hargreaves, A. (2019). *Social housing in an era of austerity: policy, politics and practice*. Routledge.
- [28]. McDonald, A., & Brailsford, S. (2015). The environmental impact of building materials. *Journal of Cleaner Production*, 97, 120-128.
- [29]. Nunez, P., Garrote, L., & Vazquez, E. (2019). Renewable energy in social housing: a review of the literature. *Renewable and Sustainable Energy Reviews*, 110, 402-411.
- [30]. Parekh, N., Johnson, K., & Lofthouse, V. (2020). The role of social housing in supporting local economic growth: Evidence from the UK. *Urban Studies*, 57(1), 43-58.
- [31]. Rodriguez, J., & Gomez, M. (2021). The role of sustainable social housing in addressing issues of inequality and exclusion in the housing market. *Journal of Housing and the Built Environment*, 36(3), 205-215.
- [32]. Rueda, X., Gómez, M. A., & Zornoza, R. (2018). The impact of water-saving technologies on water use: A review of the literature. *Journal of Cleaner Production*, 170, 835-844.
- [33]. Smith, A. G., & Ruggles, S. (2018). *The state of the nation's housing 2018*. Joint Center for Housing Studies of Harvard University.
- [34]. Su, Y., Huang, X., & Hu, Y. (2016). The role of social housing in urban poverty alleviation in China. *Habitat International*, 54, 132-142.
- [35]. United Nations. (2019). *World population prospects 2019. Vol (ST/ESA/SE. A/424) Department of Economic and Social Affairs: Population Division*.
- [36]. Wainwright, J., & Roaf, S. (2016). *Design for sustainable housing*. Routledge.
- [37]. Wang, Y., & Li, J. (2018). The role of affordable housing in reducing poverty and improving living standards for low-income families. *Journal of Housing and the Built Environment*, 33(1), 75-85.
- [38]. Wu, Y., & Zhang, L. (2019). The importance of cultural and social diversity in housing design for creating inclusive and diverse communities in sustainable social housing developments. *Journal of Housing and the Built Environment*, 32(4), 215-225.
- [39]. Zhu, X., & Chen, Y. (2019). The relationship between green spaces, natural light and ventilation, and health and well-being in sustainable housing developments: A review of the literature. *Environmental Health and Preventive Medicine*, 24(1), 18-27.
- [40]. Zuo, J., Wang, X., & Liu, Y. (2017). Renewable energy development in China: Status, trends, and prospects. *Renewable and Sustainable Energy Reviews*, 68, 168-174.