



The Concept of Eco-Cities in Indonesia and China with Carbon Neutrality and Climate Change Perspective: Literature Review

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Abstract. Due to climate change, many other countries such as Indonesia and China would aim for a zero carbon emission target before 2030. Indonesia and China are two countries that have been affected bilaterally by the concept, model, and policy of eco-cities. Both two countries also have another side to implication eco-cities. The city's image and the quality of life of its residents can both benefit from the application of green building planning and design. A key place and action unit in advancing low-carbon economic transformation as well as high-quality economic and social growth is the city, which serves as symbol of modern civilization. This paper provides an overview of carbon neutrality and how to sustain an ecological environment with eco-cities and urban green planning. This study presents a literature review of the carbon neutrality concept and sustainable urban green planning. The studies focus on the concept of eco-cities in Indonesia and China with carbon neutrality perspective with examine the analysis the concept of eco cities of two countries, specific key concept and goals of strategies of zero net carbon. As the result, this paper considers eco cities as developing of sustainability and low carbon society for the solution to mitigate climate change. This review is a significant step in creating a discussion on integrating urban Green Infrastructure components and reducing carbon peak emissions, and it should be taken into consideration.

Keywords: Eco cities · Carbon Neutrality · Climate Change · Sustainability

1 Introduction

Cities, which are built on the premise of high resource consumption as a symbol of modern society, also make a huge contribution and have a huge impact on developing economics, society, and culture. Around 80% of the economic activity that takes place around place in cities. According to the UN Department of Economic and Social Affairs, currently 55% of the world's population lives in urban areas; this ratio is anticipated to expand by 69% by 2050 (Dorling 2021). Give a city as a central role in activities that strain the Earth's natural ecosystems (Subramanian 2019). In terms of the ecological environment of the Earth's atmosphere and other surfaces, the current of industrial civilization has caused a massive transformation in cities and countryside (Shao 2015a). The

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greenhouse effect and climate change are now global concerns as a result of this transformation. Due to the fact that climate change should be of concern to global, national, and local organizations to secure their attention (Rajkhowa and Sarma 2021). According to the IPCC, the current report on GHG emissions for 2019 shows a global temperature rise of 1.5 °C above pre-industrial levels (UNEP 2019). Following the Paris Agreement on 2015 many others countries wants to be a climate neutral by 2050 as the primary goals to rise average the global temperature is absolutley results of human activity (Liu et al. 2022). For supporting this many others countries including Indonesia and China have achieve to proposed net zero targets. On 2020, China government announced that China would aim to peak carbon emission before 2030 and achieve carbon neutrality before 2060 (XU 2022). Meanwhile, According to Ministry of Energy and Mineral Resources Indonesia also having a target to emission and reduction zero net carbon by 2060.

Low carbon emission is not only by energy sector but also all the sectors. It is up to the construction industry, as one of the three greates energy consumer including with transportation (Wang et al. 2021). The low carbon and the concept of “Eco city” are promoted by global and local policies as solution to concern sustainable development. Originally the basic principles of “Eco city” generalized from four aspect health, security, vigor and sustainable (Yang et al., 2004). From this basic concept, eco cities have priority among all type of socio-economic as the basis of win solution between economic and natural process (Yang 2012). According to (Roseland 1997) the concept of the eco-city draws considerably from other movements that began around the same time as urban ecology, as well as from philosophers and scholars whose ideas originated comparable concepts decades earlier. From this idea, sustainable city planning in the future will be based on what has been learned from the past and will look ahead to problems that will arise in the future. One of the most widely promoted concepts for sustainable urban development is eco-cities (Bibri 2021). The goals of sustainable eco-cities are to adapt to climate change and to promote a low-carbon society powered by renewable energy. The development of eco-city ideas, especially in China and Indonesia, has many practical uses. According to (Mayona 2021) Indonesia has key factors for sustainable cities, such as transportation, flood prevention, green infrastructure, and recycling. In Indonesia, the majority of the development of the concept of eco-cities has been concentrated in five major cities: Jakarta, Surabaya, Palembang, Balikpapan, Makassar, and Palembang. Meanwhile, in China, “new eco-towns” are under development, with more than 250 existing cities having plans to become “eco-cities” or “low carbon cities” (Lin 2018). This paper studies focus on the concept of eco-cities in Indonesia and China with carbon neutrality prespective with examine the analysis the concept of eco cities of two countries, specific key concept and goals of strategies of zero net carbon. As the result, this paper consider eco cities as developing of sustainability and low carbon society for the solution to mitigate climate change.

2 Research and Methodology

2.1 Literature Review

To create a repository of research that explores eco-cities or ecological cities from both a theoretical and an empirical perspective, we performed a bibliographic survey of the scientific literature. The current study conducted a literature review on books and research papers that had been published in journals subjected to peer review. A thorough literature review was conducted for this research on eco-cities and other scopes related to the topic. There are several steps to allow systematically and analyzing existing academic literature (Pickering, Johnson, and Byrne 2021).

2.2 Data Collection

The academic literature was conducted for review based on Web of Science (WoS) and Scopus as the data sources. The data contains a wide range of publications and can be searched using keyword analysis, which employs Boolean operators (AND, OR or NOT) to include and excluded relevant keyword (Pickering et al. 2021). The time range covered by select review was from 2020 to 2022, with the terms (eco AND cities OR green AND cities OR ecological AND city) including peer-reviewed articles. This resulted in 60 articles from Scopus and a preliminary screening found 20 relevant articles. Yet, The second search papers related with climate change and carbon neutrality with terms (climate AND change OR climate AND neutral OR global AND warming) AND (climate AND change) OR (EXCATKEYWORD, “Climate Change”) AND (LIMIT-TO “Global Warming”) OR (“Carbon Dioxide”) OR (“Greenhouse Effect”) OR (“Greenhouse Gas”) with time range was from 2019–2022, the resulted in 172 articles from Scopus. After removing duplicate articles with same topic, abstract of the remaining the total articles was reviewed is about 60 articles for two indicators.

3 Results and Discussion

3.1 Carbon Neutrality and Urban Green Planing

Although environmental concerns and a desire to demonstrate sustainability were important, one of the commitments to sustainability could have been to pursue carbon neutrality. Despite a climate policy, carbon risk is commonly defined as the impact of the transition of civilization. A lot of people around the world unresponsive about reducing the carbon footprint (Rauland and Newman 2015). However, to realize the carbon targets followed with social economic, technological trends and society, market and public expectations (Hu, Jiang, and Yan 2022). Many other countries also promoting renewable energy and mobility initiatives, and boosting the number and quality of urban green space (Garcia-Lamarca et al. 2021). The originality concept of urban green planing is sustainability, was commonly low carbon, clean energy, healthy, and ecological cities. This the consideration also following with urban green building with the point of view of carbon-neutral policy. Following the strategy of urban green building or green infrastructure commonly described as campaigning for low carbon emissions and protecting

environment. The three aspect of the systematic circulation of resources, industry and spiritual culture (Jacob-Lopes, Zepka, and Deprá 2021). Cities that embrace the concept of green building in their design and construction processes are characterized by an increase in architectural styles that incorporate components that save energy and cut emissions. The effects of climate change and global warming provide people with a new way of thinking about the need for energy conservation and activities that have a positive impact on the welfare of the environment, and they motivate more people to select ways of living that are eco-friendly (Chen 2021).

Supporting Urban green planning also follows changing industrial and energy structures, as well as regional economic structures, which are all part of achieving the “double carbon” target. Stabilize low costs and promote the GDP of the urban economy and natural environment at the same time. Building emissions in China are expected to reach 600 million tons of direct carbon dioxide by 2022 (Zhao et al. 2022). In fact, there is no economic or technological challenge to achieving zero direct carbon emissions inside a building. The building and construction industry will be linked to the local economy and society in order to grow in the future. It is imperative that green building and urban planning be used as catalysts. The appreciation of Urban green planning is green infrastructure, recognition and use of ecosystem services in their current manifestation present with a number of problems regarding with long-term generation.

3.2 Development of Eco-Cities

Over the course of the past two decades, eco-urbanism has seen significant growth, and its purview has grown to encompass a variety of features related to environmental sustainability. A sustainable cities is a set of strategies to construct sustainable development urban and regional planning current a new cities. Generally, the term eco-city as harmony relationship between humans and nature (Cao and Li 2011). Back on 1970’s Richard Register founded Urban ecology, the eco city concept has gained worldwide as interdisciplinary cooperation (Bibri and Krogstie 2020). Today, the modern concept of eco-city with future-oriented and campaign low carbon emission, green infrastructure and ecological environment, healthy and saving energy. Following with developing of technology and enables networking to rapid changed the information. However, globalization also contribute to made new innovation for developing cities and countries. Continuously the creative renewal public space, combine with technological applications and created with multidisciplinary system (Landry 2012). The eco-city concept is a subdivision of all-inclusive sustainable development, and furthermore, it follows a more specific set of guidelines. Eco-City has a strong relationship with the concept of “ecology,” as the prefix “eco-” implies. The dimensions of the eco-city concept were included and divided into several topics.

Economic

According to (World Bank,2009) among 75% economic growth takes place in urban area. This percentage is on the rise especially in developing nations. The concept of an eco-city was argue for not only a long-term vision of establish economic, but also a strong vision of how to make optimal use the resources already accesible(Saad, Ibrahim, and El Sayad 2017). The concept of community economic development originate and created their

own solution, building long-term community capability and integrating economic, social, and environmental goals (Roseland and Spiliotopoulou 2016). The importance global population grows are international commerce and investment to urbanization increasingly being emphasized. It has also been noted that cities gain a competitive in human capital as the rapid shift to a high-value, knowledge based on economy.

Green Industry

Based on the principles of industrial ecology, most recognizable features of an eco-city its factories. Cities and town has many industries should be situated for mutually depend on one another. A biggest challenge to the nation growth sector and achieve green goals. Substantial cost of green building, management competence and lack of cost control. Carrying out the sustainable development concept and reach the goals of saving energy, water, land and others conservation material, green buildings have gained and growing amount of recognition and importance (Liu et al. 2021). The green concept might also have a purpose to developing ecological city. Green building and manufacturing industries will be a good guide to implementation the quality with eco-city concept and green infrastructure.

Land Uses

In terms of eco-city concept, land use is important things before begin to made new city concept. Before beginning building on new urban areas, it is necessary to conduct out land-use planning and establish a practical land supply strategy (Shao 2015b). The current capacity of infrastructure creating growth plans and regulate land use (Morrison, Wilson, and Bell 2012). On the other hand, the process of plan-making nowadays has a clear aim to service these massive undertaking. Holistic strategy for use land, such us ramification for establishment new towns.

Population

Population have a most important to create development of Eco city, Cities in developing and wealthy countries must discover more effective ways to address the requirements of their citizens. Urban population and city size will swell. Urban areas make up only 2% of the Earth's land surface, but they emit 78% of all greenhouse gases. Urbanization affects climatic and environmental change. Population and construction land represent a city's size. Planning urban space and infrastructure requires knowing the city's size. Several components of sustainable development plan should be considered while deciding city size. Implementation of regional balance; population size based on ecological carrying capacity; reasonable urban land size.

Society and Sustainability

Most of the literature review concern with environmental, economic and sustainability over the social sustainability (Bibri and Krogstie 2020). Compare with cities in poor or rich countries as judged by sustainability indicates. Many other situation, establishment of stable economic and opening space for increased attention and concern with environmental both of potential outcomes of sustainable practices. A society with fewer divisions leads to the development of integrated urban communities that have the potential to be self-sufficient in the foreseeable future (Shimamura and Mizunoya 2020).

3.3 Implementation and Policy of Eco-City in Indonesia and China

The application of eco-city in each countries is different, putting eco-cities into practice such us in China and Indonesia both in terms of condition and policy are treatment that is prioritized with in. The early period was in China, the new towns about new concept cities of industry. The application of low - carbon technologies in urban planning is mostly focused on the areas of transportation, public infrastructure, economic and environmental land use, and construction engineering. In China, society believe that the problems of “urban diseases” most likely about inefficient urban land use for industrial land and housing supply, transportation system still need more improvement for efficiency coverage accessibility public transportation, construction technology for management building and quantities of energy(Anon 2022). More than 40 kinds of eco-cities having a goal project and over 15 kinds for the low carbon city (Shao 2015b). Tianjin eco-cities was created under high level inter-government as an Eco-city also as a Low Carbon city and seen the positive effects for ecological planning(Lin 2018). But on the other hand, practical eco-city in China also having a fail another issue with Yangzhou’s ecocity practice is the way in which foreign institutions and local communities interact in terms of knowledge transfer, learning, and modifications to local policies and practices in order to adapt and implement the concept (Romano 2018). Transition city is Carbon neutral, Eco-city has a big impact on making a green ecosystem and achieving goals of zero net carbon. For cities towards becoming carbon-neutral and environmentally sustainable, new technology, innovative urban design, enabling policies and regulations and new processes for urban planning and management are all necessary. Due to the failure of ecocity’s implementation, it is clear that social concerns are still not given the same weight as technological ones (Joss 2015).

In Indonesia, Due to the nature of these settings, it is necessary to do research on the environment that focuses on the interactions between living species and the urban environment. This discipline of ecology is known as urban ecology (Mayona 2021). The implementation of ecocity planning, specifically for the City of Surabaya, is intended to make the city cleaner, greener, and more energy-efficient so that urban residents can live in comfort. Surabaya’s Green Building Awareness Award recognizes the city’s building managers who have shown exemplary commitment to the green building idea, one of the eco city’s many applications (Syafitri, Susetyo, and Setiawan 2020). It is also required to build additional facilities in residential areas during urban planning and design to meet the fundamental needs of people. Therefore, the locations of these service centre should be chosen in order to serve as many general public. City industry integration, Establishing economic and technological development zones and high-tech industrial parks on the suburbs of main urban areas and attracting high-quality industrial projects with tax reductions and exemptions as well as low land costs is one way to achieve high-quality urban expansion. This can be accomplished by setting up economic and technological development zones on the outskirts of main urban areas. Built a modern service industry is creating new growth driver in economic sectors. On the other hand, developing of service industry are important to reliance urban centers area.

4 Conclusions

The concept of eco-cities having a huge contribute especially in Asia including China and Indonesia, with eco-cities having a significant portion to concern regarding global climate change. This study aimed how implementation eco-cities in China and Indonesia and what the difference terms and policy in two countries. To this end, a systematic literature review has assessed 60 academic peer review journal related to Eco-cities and Climate Change. It has aimed to take the major of topic research and reflect for future research opportunities. However, Bringing sustainable cities not only improves the conventional construction mode but also achieves the saving energy and emission reduction also coordinate with other componet stage holder.

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